ABSTRACT/SUMMARY

Acceptance sampling plans have been widely used in industries to make sure the high quality of incoming and outgoing products. These sampling plans are very useful to the manufacturer and the buyer for the acceptance of good products and rejection of bad products. Among many acceptance sampling schemes, the skip lot sampling scheme is used for reducing the amount of inspection of a product that has an exceptional quality history. Therefore the objective of this study is to propose a skip-lot sampling plan which provides the minimum average sample number as compared to existing sampling plans. To achieve this goal, three approaches have been used.

In the first approach we present a designing methodology for batch inspection from a continuous process called the skip-lot sampling plan of type R (SkSP-R). The concept of resampling has been used in our proposed plan. We formulate the optimization problem of minimizing the average sample number to determine the plan parameters of the proposed SkSP-R sampling plan. The constraints are to satisfy the producer's risk at the acceptable quality level and the consumer's risk at the limiting quality level. The tables are presented and the results are explained with the help of an example. To check the statistical difference between the proposed plan and the existing plans, the Friedman test is applied. The efficiency of the SkSP-R sampling plan is also shown in terms of probability of acceptance and average sample number. The proposed plan is found more efficient than the single sampling plan, SkSP-2 sampling plan and SkSP-V sampling plan in terms of the average sample number.

In the second approach we present an optimal designing methodology of the proposed plan based on the most widely used process capability index C_{pk}. For designing the optimal parameters, we consider both symmetric and asymmetric fraction non-conforming cases. Tables are constructed for each case. Advantages of the proposed plan over the existing plan are also discussed. Application of the plan is explained with the help of a real life example.

Thirdly we present the designing of the proposed plan for time truncated life test. We consider the three most important life time distributions such as Weibull distribution, Exponentiated Weibull (EW) distribution and Birnbaum-Saunders (BS) distribution. The plan parameters of the SkSP-R plan under these three distributions are determined through a nonlinear optimization problem. Tables are constructed for these distributions using different shape parameters. The efficiency of the proposed plan over the existing plans is also discussed. A comparison is also made between three distributions in terms of ASNs and it has been observed that Birnbaum-Saunders distribution provides minimum ASN as compared to the other two distributions.