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Research Article

Construction Of Skip Lot Sampling Plan Conditional Repetitive Group Sampling Plan (CRGS) As Reference Plan Indexed Through Quality Region

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ABSTRACT

In this paper explain the sampling plan is referred to as the designing procedure for Skip lot sampling plan Conditional Repetitive Group Sampling Plan **(**CRGS) as reference plan. The table values are constructed by various parameters involved in SkSP-R with CRGS as reference plan.

Keywords: Skip lot sampling plan, SkSP-R, Conditional repetitive group sampling plan (CRGS), Quality intervals.

1. Introduction

The major area of statistical quality control is acceptance sampling. The acceptance quality control sampling system that was developed encompassed the concept of protecting the consumer from getting unacceptably defective material, and encouraging the producer in the use of process quality control by varying the quality and severity of the acceptance inspection in direct relation to the importance of the characteristic inspected, and in inverse relation to the goodness of the quality levels as indicated by those inspection. It can be used to make sure that the quality of incoming parts satisfies certain requirements before they are assembled, that the quality of semi-finished products is acceptable before they are passed to the next manufacturing stage, or that the quality of finished products satisfies the customer's specifications before they are shipped.
Acceptance sampling is an important field of statistical quality control that was popularized by Dodge and Roming and originally applied by the U.S. military to the testing of bullets during World War II. Dodge reasoned that a sample should be picked at random from the lot, and on the basis of information that was yielded by the sample, a decision should be made regarding the disposition of the lot. In general, the decision is either to accept or reject the lot. This process is called Lot Acceptance Sampling or just Acceptance Sampling.
A sample from the inspection lot is inspected, and if the number of defective items is more than the stated number (the number is decided using statistics after a decision is taken about confidence level depending upon the place of application of the product and its criticality) known as Acceptance Number, the whole lot is rejected. The purpose of Acceptance Sampling is, therefore, to decide whether to accept or reject the lot. It does not control the quality during the process of manufacturing. So, in simple words "Acceptance sampling is "the middle of the road" approach between no inspection and 100% inspection.

Operating Procedure

The operating Procedure of Skip Lot Sampling Plan-R with Conditional Repetitive Group Sampling Plan as reference plan is as follows
1. Start with normal inspection using Conditional Repetitive Group Sampling Plan as reference plan.
2. When the consecutive i lots are accepted on normal inspection then switch to skipping inspection.
3. When one lot is rejected on skipping inspection then inspect the next k consecutive lots produced.
4. When one lot is rejected while inspecting k lots then switch to normal inspection.
5. When all the k consecutive lots are accepted, proceed as in step 2.
6. Screen each rejected lot and correct or replace all the nonconforming units found.

Quality Decision Region (QDR)

This is an interval of quality ($p_1 < p < p_*$) in which product is accepted at Engineer's quality average. The quality is maintained up to p*. (MAPD) and sudden decline in quality is expected. This region is also called Reliable Quality Region (RQR).

Quality decision Range denoted as $d_1 = (p_* - p_1)$ is derived from probability of acceptance with

$$P_a(p_1 < p < p_*) = P_a(P) = \frac{fP+(1-f)P^i+fP^k(P^i-P)(1-Q^m)}{f(1-P^i)\left[1-P^{k(1-Q^m)}\right]+P^i(1+fQP^k)} \text{ for } p_1 < p < p_*$$

Probabilistic Quality Region (PQR)

This is an interval of quality ($p_1 < p < p_2$) in which a product is accepted with a minimum probability 0.10 and maximum probability 0.95. Probabilistic Quality Range denoted as $d_2 = (p_2 - p_1)$ is derived using the probability of acceptance expression.

$$P_a(p_1 < p < p_2) = P_a(P) = \frac{fP+(1-f)P^i+fP^k(P^i-P)(1-Q^m)}{f(1-P^i)\left[1-P^{k(1-Q^m)}\right]+P^i(1+fQP^k)} \text{ for } p_1 < p < p_2$$

Where $e^{-np}+npe^{-np}e^{-npm}{}_{2p,}$ Where P is the operating characteristic function of quality intervals $d_1 < d_0 < d_3 < d_2$.

Limiting Quality Region (LQR)

It is an interval quality ($p_* < p < p_2$) in which product is accepted with a minimum probability 0.10 and maximum probability 0.95. Limiting Quality Range denoted as $d_3 = (p_2 - p_*)$ is derived from t he average probability of acceptance

$$P_a(p_1 < p < p_2) = P_a(P) = \frac{fP+(1-f)P^i+fP^k(P^i-P)(1-Q^m)}{f(1-P^i)\left[1-P^{k(1-Q^m)}\right]+P^i(1+fQP^k)} \text{ for } p_* < p < p_2$$

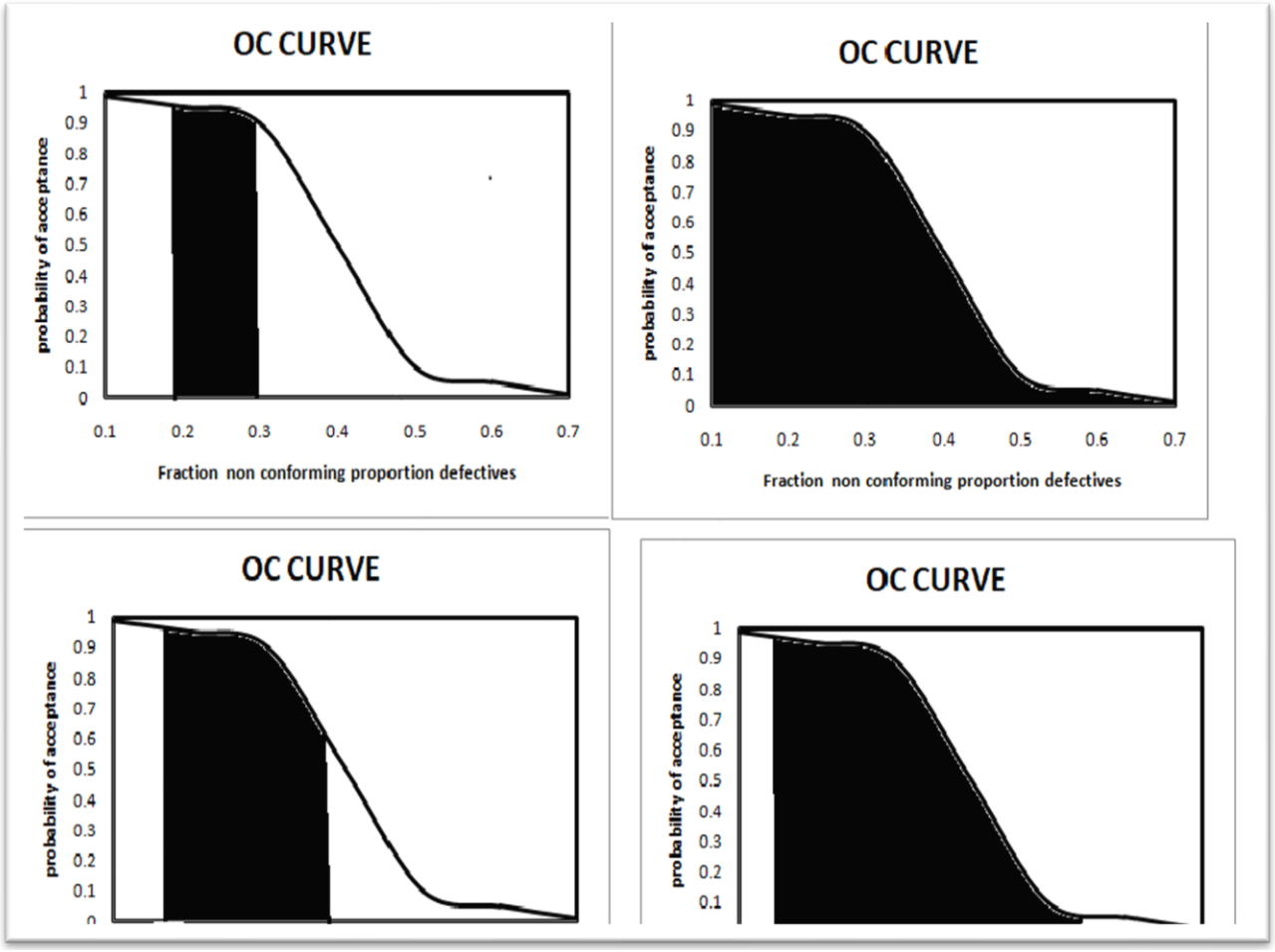
Indifference Quality Region (IQR

It is an interval quality ($p_1 < p < p_0$) in which product is accepted with a minimum probability 0.50 and maximum probability 0.95. Indifference Quality Range denoted as $d_0 = (p_0 - p_1)$ is derived from the average probability of acceptance

$$P_a(p_1 < p < p_0) = P_a(P) = \frac{fP+(1-f)P^i+fP^k(P^i-P)(1-Q^m)}{f(1-P^i)\left[1-P^{k(1-Q^m)}\right]+P^i(1+fQP^k)} \text{ for } p_1 < p < p_0$$

F	i(SkSP)	k	m	i(CRGS)	c_1	c_2	T_1=d1/d3	T_2=d1/do
	1	1	1	1	1	2	0.20753	0.62709
	1	1	1	1	1	3	0.23960	0.74581
½	1	1	1	1	1	4	0.24919	0.77165
	1	1	1	1	1	5	0.25061	0.78527
	1	1	1	1	1	6	0.24987	0.76363
	1	1	1	1	1	8	0.24233	0.78733
	1	1	1	1	1	8	0.48788	1.08700
1/3	1	1	1	1	1	8	0.63695	1.33618
	1	1	1	1	1	8	0.82129	1.54942
	1	1	1	1	1	8	0.73891	1.65419
½	1	1	1	1	1	2	0.09481	0.62673
1/3	1	1	1	1	1	2	0.09467	0.64662
1/5	1	1	1	1	1	2	0.03040	0.05014
2/5	1	1	1	1	1	2	0.21192	0.63874
2/7	1	1	1	1	1	2	0.02373	0.07122
	1	1	1	1	1	2	0.22787	0.67495
	2	1	1	1	1	2	0.29806	0.93687
1/5	3	1	1	1	1	2	0.31741	1.10937
	4	1	1	1	1	2	0.31851	1.23404
	5	1	1	1	1	2	0.31317	1.31010
	1	1	1	1	1	2	0.21416	0.63646
	1	2	1	1	1	2	0.21539	0.66341
¼	1	3	1	1	1	2	0.21498	0.67364
	1	4	1	1	1	2	0.21546	0.6713
	1	5	1	1	1	2	0.21546	1.07419

	1	1	1	1	1	2	0.27350	0.58186
	1	1	2	1	1	2	0.26931	0.60863
2/3	1	1	3	1	1	2	0.26580	0.61409
	1	1	4	1	1	2	0.26280	0.62446
	1	1	5	1	1	2	0.26015	0.62813
	1	1	1	1	1	2	0.20362	0.47344
	1	1	1	2	1	2	0.20380	0.45762
1/5	1	1	1	3	1	2	0.20379	0.45407
	1	1	1	4	1	2	0.20374	0.45434
	1	1	1	5	1	2	0.20374	0.45434



Where, P is the probability of acceptance for reference plan and Q=1-P. The reference plan is with conditional repetitive group sampling plan and its parameters fixed. The Operating ratio for the selection of sampling plan are given the parameters. For example when n=100, f=1/3, i= 1, k=2, m_1=2, m_2 =1 each of the entries by n and leads to the values given below

P_a(P)	0.99	0.95	0.90	0.50	0.10	0.05	0.01
P	0.9987	0.9512	0.8993	0.4953	0.1034	0.5012	0.0105

2. CONCLUSIONS

In this article we have developed tabled and designing methodology for selecting the parameters of a system of skip-lot sampling plan of type sksp-R with conditional repetitive group sampling plan as the reference plan under the conditions of Quality regions. The approach of two points on the OC curve is adopted to find the design parameters of proposed plan. In this proposed plan is useful in reducing the cost and the time of the inspection of the material or the product where skip lot sampling is used.

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