

## CHAPTER III

### DESIGNING OF COMBINED CONTINUOUS LOT BY LOT ACCEPTANCE SAMPLING PLAN

This chapter presents the derivation of performance measures using Markov-chain approach due to Roberts (1965) to the combined continuous lot by lot acceptance sampling plan of Govindaraju and Bebbington (2000) which combines certain features of continuous sampling plan and lot by lot sampling plan. The operating procedure of the plan is given. Designing of the combined continuous lot by lot acceptance sampling plan indexed by  $(n/N, AQL)$  and  $(n/N, LQL)$  are presented. AOQL and AFI are provided to the designed plans for selected choices of the parameters. Method for the construction of tables is given. Examples are provided to illustrate the selection of plans.

For production processes involving very low fraction nonconforming. Pesotchinsky (1987) devised a scheme that includes both the strategies of continuous and lot by lot inspection plans formed together with certain criteria for switching between the strategies. The scheme proposed by Pesotchinsky(1987) is complex and difficult to implement. As an alternative to Pesotchinsky's complex scheme Govindaraju and Bebbington (2000) recommended a simple combined continuous lot by lot plan. For this scheme the performance measures were derived by following Markov-chain approach due to Stephens (1995).

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In this chapter, derivation of performance measures using Markov-chain approach due to Roberts (1965) is followed as an alternative to Stephens (1995) for the simplified scheme proposed by Govindaraju and Bebbington (2000). The method of designing the plan indexed by AQL with producer risk of 0.95 along with  $n/N$  and LQL with consumer risk of 0.10 along with  $n/N$  are given. The primary index AOQL and the measure of performance AFI are evaluated for the designed plan. Implementation of the plan is illustrated numerically.

The operating procedure of combined continuous lot by lot acceptance sampling plan consists of the following steps. When the units are offered for inspection from a production process

Step 1: Start with the screening inspection of the units consecutively until  $i$  units in succession are conforming

Step 2: When  $i$  units in succession are found conforming discontinue cent percent inspection and form lots of desired size and inspect lot by lot by applying any sampling inspection plan as reference plan.

Step 3: If a lot is rejected, revert to screening inspection of units; otherwise, continue with lot by lot inspection.

In the lot by lot sampling inspection consider  $ASN/N$  as the fraction of sampling where  $ASN$  is the average sample number of the lot by lot sampling plan considered and  $N$  is the lot size. This combined continuous lot by lot acceptance sampling plan is indexed by the parameter  $i$  and the parameters of the reference sampling plan ( $N, n, c$ ).

Fig. 3.1 presents the flow diagram to explain the operating procedure of the combined continuous lot by lot acceptance sampling plan.

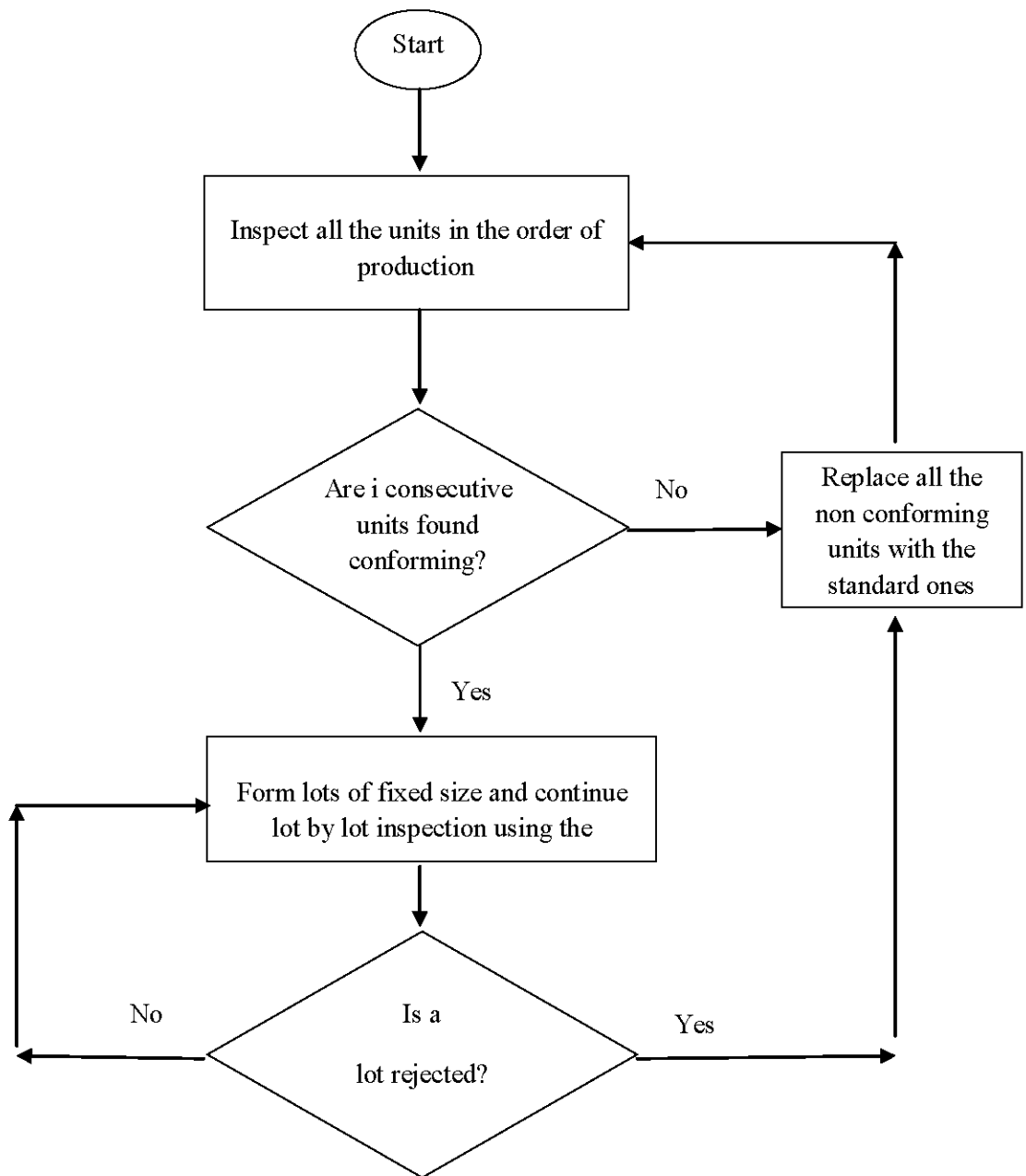


Fig. 3.1 Flow Diagram of the Operating procedure of combined continuous lot by lot acceptance sampling plan

## Derivation of performance measures

Performance measures of combined continuous lot by lot acceptance sampling plan are derived using Markov-chain approach due to Roberts (1965).

Let  $[X_n], n = 1, 2, \dots$  denote the discrete parameter Markov-chain with finite state space  $(S_k)$ , where  $k = 1, 2, \dots (i + 3)$ .

The states of the process relating to the combined continuous lot by lot acceptance sampling plan are defined as

$$S_k = A_{k-1}, k = 1, 2, 3, \dots, (i + 1)$$

= 100 percent inspection is being conducted and including the latest article inspected and the last  $k - 1$  consecutive articles were found to be conforming.

$$S_{i+2} = SA$$

= Lot by lot sampling is in effect and the last lot submitted was inspected and accepted

$$S_{i+3} = SR$$

= Lot by lot sampling is in effect and the last lot submitted was inspected and rejected

These set of  $(i + 3)$  states defined above completely describes the mutually exclusive states of inspection for combined continuous lot by lot acceptance sampling plan. The transitional Probability matrix of various states of combined continuous lot by lot acceptance sampling plan is given in Table 3.1

The combined continuous lot by lot acceptance sampling plan applied to an inspection process which is in statistical control may be viewed as a discrete parameter Markov-chain which is finite, irreducible and aperiodic.

Table 3.1 Transition Probability Matrix

		States at $(t + 1)^{st}$ trial							
		$A_0$	$A_1$	$A_2$	...	$A_{i-1}$	$A_i$	SA	SR
States at $t^{th}$ trial	$A_0$	$p$	$q$	0	...	0	0	0	0
	$A_1$	$p$	0	$q$	...	0	0	0	0
	$A_2$	$p$	0	0	...	0	0	0	0
	...	...	...	...	...	...	...	...	...
	$A_{i-1}$	$p$	0	0	...	0	$q$	0	0
	$A_i$	$p$	0	0	...	0	0	$P$	$1 - P$
	SA	0	0	0	...	0	0	$P$	$1 - P$
	SR	$p$	$q$	0	...	0	0	0	0

In the matrix,

$p$  – the fraction of nonconforming items in the process

$q = 1-p$ , the fraction of conforming items in the process

$P$  – operating characteristic function of the reference plan

The vector of limiting probabilities  $\pi$  can be determined using the steady state equations. The steady state probabilities  $\pi_j$  satisfy the following conditions

$$\pi_j = \sum_{k=1}^{i+3} \pi_k p_{kj}$$

$$\pi_j > 0 \text{ for } j = 1, 2, \dots, (i + 3)$$

such that  $\sum_{k=1}^{i+3} \pi_k = 1$

These conditions result in the following equations

$$\pi_0 = p(\pi_0 + \pi_1 + \pi_2 + \dots + \pi_{i-1} + \pi_{SR})$$

$$\pi_1 = q(\pi_0 + \pi_{SR})$$

$$\pi_j = q^{j-1}\pi_1 \text{ for } j = 2, 3, 4, \dots, i$$

$$\pi_{SA} = P(\pi_i + \pi_{SA})$$

$$\pi_{SR} = (1 - P)(\pi_i + \pi_{SA})$$

On simplifying, the steady state probabilities are

$$\pi_0 = p(1 - q^i)(1 - P)/D$$

$$\pi_j = q^j p(1 - P)/D \text{ where } j = 1, 2, \dots, i$$

$$\pi_{SA} = pq^i P/D$$

$$\pi_{SR} = pq^i(1 - P)/D$$

where  $D = (1 - P)(1 - q^i) + pq^i$

The performance measures of the plan from the derived steady state probabilities are

- (i) The average number of units inspected under the screening inspection is

$$U = (1 - q^i)/pq^i \quad (3.1)$$

- (ii) The average number of lots passed under the sampling inspection is

$$V = 1/(1 - P) \quad (3.2)$$

- (iii) The OC function of the combined continuous lot by lot plan is

$$P_a = pq^i P/D \quad (3.3)$$

- (iv) If  $n/N$  is the fraction of the lot sampled then average outgoing quality is

$$AOQ = (1 - n/N)p^2q^i P/D \quad (3.4)$$

The maximum of AOQ function is AOQL.

- (v) The average fraction inspected (AFI) in the sampling inspection is

$$AFI = ((1 - P)(1 - q^i) + (n/N)pq^i)/D \quad (3.5)$$

$$\text{where } D = (1 - P)(1 - q^i) + pq^i$$

### **Designing plans for given (AQL, n/N) and (LQL, n/N)**

Tables 3.2 to 3.7 are constructed for designing the combined continuous lot by lot acceptance sampling plan indexed by certain selected values of AQL with  $P_a = 0.95$ , LQL with  $P_a = 0.10$  for sample size,  $n$  acceptance number,  $c$  and sample fraction,  $n/N$  using the iterative procedure. Along with the parameter  $i$ , AOQL and AFI values are calculated and presented. Here single sampling plan is used as the reference plan.

Numerical values presented in the tables reveal the following features

- (i) increase in AQL decreases the clearance number irrespective of  $n/N$
- (ii) increase in LQL decreases the clearance number irrespective of  $n/N$

- (iii) increase in  $n/N$  decreases AOQL and increases AFI irrespective of AQL and LQL
- (iv) increase in AQL and increase in LQL increases AOQL irrespective of  $n/N$
- (v) increase in AQL and increase in LQL increases AFI irrespective of  $n/N$

### **Selection of plans**

- (i) Suppose that one wishes combined continuous lot by lot acceptance sampling plan with AQL of 0.035% with probability of acceptance 0.95, the sample fraction of 10% and acceptance number  $c = 2$ . From the constructed table one obtains the required plan  $(i, n/N, n, c)$  as (123, 1/10, 400, 2).

For this plan AOQL is 0.0004686 which is the worst quality received by the consumer by the application of the constructed plan. At this worst quality the amount of inspection is 0.4153.

- (ii) Suppose that one desires to have the combined continuous lot by lot acceptance sampling plan with LQL of 0.4% with probability of acceptance 0.10, the sample fraction of 5% and acceptance number  $c = 1$ . From the constructed table 3.5 one obtains the required plan as  $(i, n/N, n, c) = (16, 1/20, 300, 1)$ .

For this plan AOQL is 0.0023822 which is the worst quality received by the consumer by the application of the constructed plan. At this worst quality the amount of inspection is 0.3232.

- (iii) Suppose that one requires combined continuous lot by lot acceptance sampling plan with LQL of 0.5% with probability of acceptance 0.10, the sample fraction of 20% and acceptance number  $c = 3$ . From the constructed table one obtains the required plan as  $(i, n/N, n, c) = (654, 1/5, 100, 3)$ .

For this plan AOQL is 0.0016413 which is the worst quality received by the consumer by the application of the constructed plan. At this worst quality the amount of inspection is 0.3639.

## Application of plan

Suppose that one wishes to apply combined continuous lot by lot acceptance sampling plan with AQL of 0.025% with probability of acceptance 0.95, the sample fraction of 5% and acceptance number  $c = 1$ . From the constructed table 3.2 one obtains the required plan  $(i, n/N, n, c)$  as  $(166, 1/20, 300, 1)$ .

The application of the selected plan is done as follows

Start with the screening inspection of units submitted in the order of production. If 166 units in succession are found to be conforming, form lots of desired size  $N = 6000$  and move to lot by lot inspection. Choose a sample of size  $n = 300$  from the lot and inspect it. If the sample has zero or one defective unit, accept the lot and continue with lot by lot inspection. If more than one defective occurs in the sample then revert to screening inspection of unit by unit.

For this plan AOQL is 0.0005135 which is the worst quality to be received by the consumer by the application of the constructed plan. At this worst quality the amount of inspection is 0.5149.

## Construction of Tables 3.2 to 3.7

The OC function of combined continuous lot by lot acceptance sampling plan derived in (3.3) is

$$P_a = pq^i P/D \quad (3.3)$$

where  $P$  is the probability of acceptance of the reference sampling plan for lot by lot inspection. Under the conditions of Poisson model with single sampling reference plan

$$P = \sum_{d=0}^c e^{-np} (np)^d / d!$$

For selected values of  $n, c, AQL$  at  $P_a = 0.95$  the values of  $i$  is determined using search procedure.

If  $n/N$  is the fraction of the lot sampled then average outgoing quality is

$$AOQ = ((N - n)/N)p^2q^iP \quad (3.4)$$

With the designed value of  $i$ , AOQL, the maximum of AOQ function is obtained by the iterative method for certain selected values of  $n/N$ .

The average fraction inspected (AFI) in the sampling inspection is

$$AFI = ((1 - P)(1 - q^i) + (n/N)pq^i)/D \quad (3.5)$$

the average fraction inspected is calculated at  $p$ , the fraction nonconforming in the process at which the AOQL is attained.

Tables 3.2 to 3.7 are constructed by assuming values for AQL ( = 0.0001, 0.000125, 0.00015, 0.000175, 0.0002, 0.00022, 0.00025, 0.00035, 0.00045, 0.00065), LQL ( = 0.0015, 0.0025, 0.004, 0.005, 0.0065, 0.008, 0.01, 0.013) with  $c$  ( = 1, 2, and 3), and ASN/N (= 0.05, 0.1, 0.2).

Table 3.2 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance sampling plan indexed by AQL at  $P_a = 0.95$  with  $c = 1$

AQL	$n$ $n/N$	100			200			300		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.0001	$i$	1006	1006	1006	262	262	262	117	117	117
	AOQL	193.7	183.5	163.1	206.8	195.9	174.1	211.9	200.7	178.4
	AFI	0.4859	0.5129	0.5671	0.5208	0.5460	0.5965	0.5324	0.5570	0.6062
0.000125	$i$	651	651	651	168	168	168	75	75	75
	AOQL	245.9	232.9	207.0	261.1	247.3	219.9	267.2	253.1	224.9
	AFI	0.4936	0.5202	0.5735	0.5261	0.5509	0.6009	0.5346	0.5591	0.6081
0.00015	$i$	455	455	455	117	117	117	52	52	52
	AOQL	298.7	282.9	251.5	0.4997	0.5260	0.5787	323.4	306.4	272.4
	AFI	0.4997	0.5260	0.5787	0.5285	0.5533	0.6029	0.5365	0.5609	0.6097
0.000175	$i$	336	336	336	86	86	86	38	38	38
	AOQL	351.8	333.3	296.4	370.9	351.4	312.4	380.9	360.9	320.8
	AFI	0.5047	0.5308	0.5829	0.5309	0.5556	0.6050	0.5366	0.5610	0.6098
0.0002	$i$	258	258	258	66	66	66	29	29	29
	AOQL	405.9	384.7	358.8	426.1	403.7	358.8	438.4	415.3	369.2
	AFI	0.5081	0.5359	0.5858	0.5322	0.5569	0.6061	0.5357	0.5601	0.6090
0.00022	$i$	214	214	214	54	54	54	24	24	24
	AOQL	448.2	424.6	377.5	473.4	448.5	398.6	483.5	458.1	407.2
	AFI	0.5114	0.5371	0.5885	0.5339	0.5585	0.6075	0.5344	0.5589	0.6079
0.00025	$i$	166	166	166	42	42	42	18	18	18
	AOQL	513.5	486.4	432.4	539.9	511.5	454.7	560.8	531.2	472.2
	AFI	0.5149	0.5404	0.5915	0.5343	0.5588	0.6078	0.5310	0.5557	0.6051
0.00035	$i$	85	85	85	21	21	21	9	9	9
	AOQL	733.5	694.9	617.7	774.5	733.8	652.2	794.6	752.7	669.1
	AFI	0.5228	0.5479	0.5981	0.5318	0.5565	0.6058	0.5112	0.5369	0.5884
0.00045	$i$	51	51	51	12	12	12	5	5	5
	AOQL	961.9	911.3	810.0	1030.7	976.5	867.9	1048.9	993.7	883.3
	AFI	0.5271	0.5520	0.6018	0.5209	0.5461	0.5965	0.4765	0.5039	0.5591
0.00065	$i$	24	24	24	5	5	5	2	2	2
	AOQL	1430.9	1355.6	1204.9	1570.8	1488.2	1322.8	1521.9	1441.8	1281.6
	AFI	0.5280	0.5529	0.6026	0.4762	0.5037	0.5589	0.3838	0.4162	0.4811

Table 3.3 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance sampling plan indexed by AQL at  $P_a = 0.95$  with  $c = 2$

AQL	$n$ $n/N$	300			400			500		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.0001	$i$	7866	7866	7866	4109	4109	4109	2328	2328	2328
	AOQL	119.5	113.2	100.6	126.2	119.5	106.3	130.2	123.4	109.7
	AFI	0.3012	0.3379	0.4115	0.3323	0.3674	0.4377	0.3487	0.3829	0.4515
0.000125	$i$	4566	4566	4566	2267	2267	2267	1251	1251	1251
	AOQL	153.9	145.8	129.6	161.4	153.9	135.9	165.6	156.9	139.4
	AFI	0.3189	0.3547	0.4264	0.3438	0.3784	0.4474	0.3580	0.3910	0.4594
0.00015	$i$	2857	2857	2857	1275	1275	1275	747	747	747
	AOQL	188.9	178.9	159.1	196.8	186.4	165.7	201.1	190.5	169.3
	AFI	0.3301	0.3654	0.4359	0.3524	0.3865	0.4547	0.3654	0.3988	0.4656
0.000175	$i$	1910	1910	1910	895	895	895	481	481	481
	AOQL	224.1	212.3	188.8	232.2	220.0	195.6	236.7	224.3	199.3
	AFI	0.3387	0.3735	0.4431	0.3599	0.3936	0.4609	0.3698	0.4030	0.4693
0.0002	$i$	1333	1333	1333	614	614	614	328	328	328
	AOQL	259.6	245.9	218.6	267.9	253.8	225.6	272.5	258.2	229.5
	AFI	0.3460	0.3805	0.4493	0.3647	0.3982	0.4650	0.3740	0.4069	0.4729
0.00022	$i$	1027	1027	1027	468	468	468	249	249	249
	AOQL	287.9	272.8	242.5	296.6	280.9	249.8	301.5	285.6	253.9
	AFI	0.3511	0.3853	0.4536	0.3683	0.4016	0.4681	0.3771	0.4099	0.4755
0.00025	$i$	721	721	721	325	325	325	172	172	172
	AOQL	330.8	313.4	278.6	339.7	321.8	286.1	345.2	327.1	290.7
	AFI	0.3573	0.3912	0.4588	0.3724	0.4054	0.4715	0.3817	0.4142	0.4793
0.00035	$i$	279	279	279	123	123	123	65	65	65
	AOQL	474.8	449.8	399.8	486.2	468.6	409.4	493.3	467.3	415.4
	AFI	0.3718	0.4948	0.4709	0.3828	0.4153	0.4802	0.3904	0.4225	0.4867
0.00045	$i$	136	136	136	60	60	60	31	31	31
	AOQL	620.9	588.2	522.8	633.5	600.2	533.5	648.2	614.0	545.8
	AFI	0.3799	0.4126	0.4779	0.3899	0.4221	0.4863	0.3949	0.4268	0.4905
0.00065	$i$	47	47	47	20	20	20	10	10	10
	AOQL	921.4	872.9	775.9	951.4	901.3	801.2	982.3	930.6	827.2
	AFI	0.3908	0.4228	0.4869	0.3954	0.4272	0.4908	0.3905	0.4226	0.4867

Table 3.4 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance sampling plan indexed by AQL  $P_a = 0.95$  with  $c = 3$

AQL	$n$ $n/N$	500			750			1000		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.000175	$i$	9245	9245	9245	3443	3443	3443	1369	1369	1369
	AOQL	180.1	170.7	151.7	191.9	181.8	161.6	198.2	187.8	166.9
	AFI	0.2269	0.2676	0.3489	0.2675	0.3061	0.3832	0.2895	0.3269	0.4017
0.0002	$i$	6589	6589	6589	2230	2230	2230	848	848	848
	AOQL	209.2	198.2	176.2	222.2	210.5	187.2	228.5	216.5	192.5
	AFI	0.2392	0.2792	0.3593	0.2760	0.3141	0.3903	0.2944	0.3315	0.4058
0.00022	$i$	5101	5101	5101	1617	1617	1617	600	600	600
	AOQL	232.8	220.6	196.1	246.6	233.6	207.6	252.8	239.5	212.9
	AFI	0.2439	0.2838	0.3634	0.2811	0.3189	0.3946	0.3974	0.3344	0.4083
0.00025	$i$	3549	3549	3549	1038	1038	1038	375	375	375
	AOQL	268.8	254.6	226.3	283.1	268.2	238.4	289.5	274.2	243.8
	AFI	0.2555	0.2947	0.3730	0.2886	0.3260	0.4009	0.3018	0.3386	0.4121
0.00035	$i$	1236	1236	1236	309	309	309	108	108	108
	AOQL	390.3	369.8	328.7	405.5	384.1	341.4	413.2	391.5	347.9
	AFI	0.2784	0.3164	0.3923	0.3026	0.3393	0.4127	0.3135	0.3496	0.4219
0.00045	$i$	522	522	522	122	122	122	42	42	42
	AOQL	512.8	485.8	431.8	530.3	502.4	446.6	542.6	514.1	456.9
	AFI	0.2923	0.3295	0.4040	0.3110	0.3473	0.4198	0.3212	0.3569	0.4284
0.00055	$i$	255	255	255	58	58	58	20	20	20
	AOQL	636.1	602.6	535.7	657.6	622.9	553.7	673.7	638.3	567.4
	AFI	0.3016	0.3384	0.4119	0.3176	0.3535	0.4254	0.3252	0.4607	0.4317
0.00065	$i$	139	139	139	31	31	31	10	10	10
	AOQL	760.6	720.6	640.5	789.2	747.7	664.7	824.6	781.2	694.4
	AFI	0.3081	0.3445	0.4173	0.3225	0.3582	0.4295	0.3231	0.3587	0.4299
0.00075	$i$	82	82	82	18	18	18	6	6	6
	AOQL	887.6	840.9	747.5	925.5	876.8	779.4	953.9	903.7	803.3
	AFI	0.3136	0.3498	0.4220	0.3248	0.3603	0.4314	0.3146	0.3507	0.4029
0.00085	$i$	52	52	52	11	11	11	3	3	3
	AOQL	1014.3	960.9	854.1	1068.7	1012.5	899.9	1148.4	1087.9	967.1
	AFI	0.3179	0.3538	0.4256	0.3233	0.3589	0.4302	0.2889	0.3264	0.4012

Table 3.5 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance sampling plan

indexed by LQL at  $P_a = 0.10$  with  $c = 1$

LQL	$n$ $n/N$	100			200			300		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.0015	$i$	557	557	557	250	250	250	101	101	101
	AOQL	2084.8	1975.1	1755.6	1641.9	1555.5	1382.6	1375.9	1303.5	1158.7
	AFI	0.2496	0.2891	0.3681	0.2932	0.3304	0.4048	0.3080	0.3444	0.4173
0.00025	$i$	240	240	240	80	80	80	39	39	39
	AOQL	2870.4	2738.2	2433.9	2186.2	2071.2	1841.0	1827.9	1731.7	1539.3
	AFI	0.2732	0.3115	0.3879	0.3071	0.3436	0.4165	0.3182	0.3541	0.4259
0.004	$i$	108	108	108	34	34	34	16	16	16
	AOQL	3820.0	3618.9	3216.9	2835.9	2686.6	2388.1	2382.2	2256.8	2006.0
	AFI	0.2915	0.3288	0.4033	0.3172	0.3531	0.4249	0.3232	0.3588	0.4307
0.005	$i$	73	73	73	22	22	22	10	10	10
	AOQL	4318.8	4119.9	3662.2	3233.5	3063.3	2722.9	2735.7	2591.7	1303.8
	AFI	0.2789	0.3358	0.4096	0.3207	0.3565	0.4279	0.3216	0.3573	0.4387
0.0065	$i$	46	46	46	13	13	13	5	5	5
	AOQL	5047.0	4781.4	4250.1	3784.5	3585.3	3186.9	3334.4	3158.9	2807.9
	AFI	0.3068	0.3433	0.4162	0.3219	0.3575	0.4289	0.3091	0.3455	0.4182
0.008	$i$	32	32	32	8	8	8	3	3	3
	AOQL	5661.2	5363.2	4767.3	4365.7	4135.9	3676.4	3819.8	3618.7	3216.6
	AFI	0.3119	0.3482	0.4206	0.3185	0.3543	0.4261	0.2889	0.3263	0.4011

Table 3.6 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance  
 sampling plan indexed by LQL at  $P_a = 0.10$  with  $c = 2$

LQL	$n$ $n/N$	100			200			300		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.0015	$i$	2215	2215	2215	1035	1035	1035	533	533	533
	AOQL	1093.3	1035.8	920.7	925.7	876.9	779.5	820.9	777.7	691.3
	AFI	0.2060	0.2478	0.3314	0.2569	0.2961	0.3743	0.2833	0.3211	0.3965
0.0025	$i$	971	971	971	372	372	372	170	170	170
	AOQL	1637.8	1551.6	1379.2	1339.1	1268.6	1127.6	1175.7	1113.8	990.0
	AFI	0.2325	0.2729	0.3536	0.2812	0.3190	0.3947	0.3014	0.3381	0.4117
0.004	$i$	425	425	425	135	135	135	57	57	57
	AOQL	2326.2	2203.8	1958.9	1859.3	1546.6	1374.8	1632.5	1546.6	1274.8
	AFI	0.2575	0.2966	0.3748	0.2995	0.3364	0.4101	0.3146	0.3507	0.4228
0.005	$i$	280	280	280	82	82	82	33	33	33
	AOQL	2730.6	2586.9	2299.4	2169.7	2055.5	1827.1	1921.1	1819.9	1617.8
	AFI	0.2693	0.3077	0.3846	0.3067	0.3432	0.4162	0.3198	0.3556	0.4272
0.0065	$i$	168	168	168	45	45	45	17	17	17
	AOQL	3283.3	3110.5	2764.9	2605.3	3110.5	2764.9	2339.8	2216.6	1970.3
	AFI	0.2819	0.3197	0.3953	0.2819	0.3197	0.3953	0.3231	0.3587	0.4299
0.008	$i$	110	110	110	28	28	28	10	10	10
	AOQL	3796.6	3596.7	3197.1	3007.0	2848.8	2532.2	2735.7	2591.7	1303.8
	AFI	0.2910	0.3283	0.4029	0.3189	0.3547	0.4264	0.3216	0.3573	0.4387
0.01	$i$	69	69	69	16	16	16	5	5	5
	AOQL	4429.4	4196.3	3730.1	3557.4	3370.1	2995.7	3334.4	3158.9	2807.9
	AFI	0.3000	0.3369	0.4105	0.3219	0.3576	0.4289	0.3091	0.3454	0.4182
0.013	$i$	40	40	40	8	8	8	2	2	2
	AOQL	5276.3	4998.6	4443.2	4365.7	4135.9	3676.4	4212.7	3990.9	3547.5
	AFI	0.3089	0.3453	0.4180	0.3185	0.3543	0.4261	0.2652	0.3039	0.3812

Table 3.7 Values of  $i$ , AOQL and AFI of combined continuous lot by lot acceptance

sampling plan indexed by LQL at  $P_a = 0.10$  with  $c = 3$

LQL	$n$ $n/N$	100			200			300		
		0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2
0.0015	$i$	4385	4385	4385	2629	2629	2629	1670	1670	1670
	AOQL	748.5	709.1	630.3	625.1	592.2	526.4	549.2	520.3	462.5
	AFI	0.1855	0.2284	0.3141	0.2292	0.2698	0.3509	0.2578	0.2968	0.3749
0.0025	$i$	2050	2050	2050	1049	1049	1049	559	559	559
	AOQL	1138.4	1078.5	958.6	920.9	872.4	775.5	808.2	765.6	680.6
	AFI	0.2083	0.2500	0.3333	0.2567	0.2958	0.3740	0.2819	0.3198	0.3953
0.004	$i$	962	962	962	397	397	397	176	176	176
	AOQL	1644.8	1558.2	1385.1	1307.9	1240.9	1103.0	1163.4	1102.1	979.7
	AFI	0.2328	0.2732	0.3539	0.2803	0.3182	0.3939	0.3009	0.3377	0.4113
0.005	$i$	654	654	654	239	239	239	98	98	98
	AOQL	1949.1	1846.5	1641.3	1550.2	1468.6	1305.5	1388.4	1315.4	1169.2
	AFI	0.2447	0.2845	0.3639	0.2901	0.3274	0.4022	0.3086	0.3449	0.4177
0.0065	$i$	405	405	405	127	127	127	48	48	48
	AOQL	2370.9	2246.1	1996.5	1895.1	1795.4	1595.9	1718.3	1627.9	1446.9
	AFI	0.2591	0.2981	0.3761	0.3003	0.3372	0.4108	0.3164	0.3524	0.4244
0.008	$i$	271	271	271	75	75	75	27	27	27
	AOQL	2763.9	2618.5	2327.6	2229.9	2112.5	1877.8	2039.3	1931.9	1717.3
	AFI	0.2699	0.3083	0.3852	0.3081	0.3444	0.4173	0.3213	0.3570	0.4285
0.01	$i$	172	172	172	42	42	42	14	14	14
	AOQL	3256.4	3084.9	2742.2	2660.3	2520.3	2240.3	2478.1	2347.7	2086.9
	AFI	0.2814	0.3192	0.3948	0.3150	0.3511	0.4232	0.3232	0.3588	0.4300
0.013	$i$	97	97	97	20	20	20	6	6	6
	AOQL	3959.8	3751.4	3334.6	3327.4	3152.2	2801.9	3168	3002.1	2668.5
	AFI	0.2935	0.3307	0.4051	0.3212	0.3569	0.4284	0.3139	0.3499	0.4284