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A CONDITIONAL REPETITIVE GROUP SAMPLING PLAN FOR TRUNCATED LIFE TESTS USING DIFFERENT LIFETIME DISTRIBUTIONS

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ABSTRACT

In this paper, a conditional repetitive group acceptance sampling plan is developed for a truncated life test when the lifetime of an item follows different distributions. Sample sizes required for the acceptance numbers are determined when the consumer's risk and the test termination time are specified. The operating characteristic values according to various quality levels are obtained. The results are explained with examples.

Keywords

Lomax distribution, Burr XII distribution, exponential and generalized exponential distribution, conditional repetitive group sampling plan, consumer's risk, Operating characteristics, Producer's risk, Truncated life test.

1. INTRODUCTION

The quality control is one of the most important tools to differentiate between the competitive enterprises in a global business market.Acceptance sampling is plan is an essential tool in the statistical quality control and is necessary to limit the cost of inspection and is the only available method to appraise the quality in destructive testing. Acceptance sampling itself does not improve quality, but whenever the lot is rejected it indicates the instability of the production process. Acceptance sampling is a cost efficient only admissible method of destructive and efficient tests with quick results. Sampling plans are necessary to provide the disposal of defective products made, which efforts are activated to control the process.

Sherman in 1965 was the one who introduced the repetitive group sampling plan. According to him the attribute repetitive group plan is more efficient than the single sampling plan even its operation is similar to sequential sampling. Later in 1984 and 1986 Soundarajan and Ramasamy tabulated values for the selection of repetitive group sampling plan indexed through (AQL, AOQL); (p_0, h_0) and (p*, h*). The study was followed by Govindaraju who established OC functions for the repetitive group sampling plans in 1987. Shankar, G. & Mohapatra B.N. in 1993 presented GERT analysis of conditional repetitive group sampling plan. In 2004, Moon, Jun, Balamurali and Lee worked on the variable repetitive group sampling plan for minimizing average sample. It was Balamurali and Jun again joined hands to determine the repetitive group sampling procedure for variables inspection in the year 2006. This repetitive group sampling plans is used to determine the number of groups by Aslam, Niaki, Rasool and Fallahnezhad in the year 2012.

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Jun C.H. et. Al., in 2006 presented variables sampling plans for Weibull distributed lifetimes under sudden death testing. Muhammad Aslam et. al., presented time truncated acceptance sampling plans for generalized exponential distribution in 2010. Mughal A. R. et. Al.,in 2011 presented economic reliability acceptance sampling plans from truncated life tests based on the Burr Type XII percentiles.

We here used the same repetitive group sampling to determine the sample size instead of determining the group. One can find that this method is far better than the other single sampling procedures due to its reduced sample sizes.

2. CUMULATIVE DISTRIBUTIVE FUNCTION

2.1 Weibull Distribution

The cumulative distribution function (cdf) of the Weibull distribution is given by

$$F(t/\sigma) = 1 - e^{-\left(\frac{t}{\sigma}\right)^{\lambda}} \quad , t > 0 \qquad (1)$$

where σ is a scale parameter and λ is the shape parameter and it is fixed as 2.

2.2 Exponentiated Weibull Distribution

The cumulative distribution function (cdf) of the exponentiated Weibull distribution is given by

$$F(t,\sigma) = \left[1 - e^{-\left(\frac{t}{\sigma}\right)^{m}}\right]^{\lambda} \quad , t > 0 \qquad (2)$$

where σ is a scale parameter and λ is the shape parameter and it is fixed as 2.

2.3 Burr XII distribution

The cumulative distribution function (cdf) of the Burr XII distribution is given by

$$F(t/\sigma) = 1 - \left(1 + (t/\sigma)^{\gamma}\right)^{-\lambda} \qquad (3)$$

where σ is a scale parameter and λ and γ are the shape parameters and it is fixed as 2.

2.4 Generalized Exponential Distribution

The cumulative distribution function (cdf) of the generalized exponential distribution is given by

$$F(t,\sigma) = \left(1 - e^{-\frac{t}{\sigma}}\right)^{\lambda} \tag{4}$$

where σ is a scale parameter and λ is the shape parameter and it is fixed as 2.

If some other parameters are involved, then they are assumed to be known, for an example, if shape parameter of a distribution is unknown it is very difficult to design the acceptance sampling plan. In quality control analysis, the scale parameter is often called the quality parameter or characteristics parameter. Therefore it is assumed that the distribution function depends on time only through the ratio of t/ σ.

3. DESIGN OF THE PROPOSED PLAN

3.1 Conditions for its application

1. Production is steady, so that results of past, present and future lots are broadly indicative of a continuing process.
2. Lots submitted may be isolated or series.
3. Inspection is by attributes, when the lot quality is defined as the proportion defective.
4. Variation in the lot quality may exist.
5. Lot has at least one defective unit.
6. Lots submitted for inspection may be of low quality.

3.2 Operating procedure of CRGS plan for truncated life test

The following is the operating procedure of the CRGS plan for truncated life tests.

1. From each of the submitted lots, select a sample of size n and observe the number of non-conformities, 'd' for the pre assigned time t0.
2. Accept the current lot if $d \le c_1$, reject the lot, if $d > c_2$.
3. If $c_1 < d \le c_2$, utilize the information of the next proceeding lot (i.e.) the current lot is accepted if the proceeding lot result shows $d \le c_1$ in the sample, in case the proceeding lot result also shows $c_1 < d \le c_2$, then utilize next proceeding lot and checkup whether $d \le c_1$ or $d > c_2$ continue utilizing the proceeding lot results till satisfying $d \le c_1$ or $d > c_2$.

The following is the operating characteristics function for the conditional repetitive group sampling plan.

$$L(p) = \frac{p_1}{1 - p_1 p_3} \tag{5}$$

We have used binomial models to determine the number of samples.

In case of binomial distribution, the equation (5) becomes

$$L(p)=\frac{\sum_{i=0}^{c_1}\binom{n}{i}p^i(1-p)^{n-i}}{1-\left[\sum_{i=0}^{c_1}\binom{n}{i}p^i(1-p)^{n-i}\right]\left[\sum_{i=0}^{c_2}\binom{n}{i}p^i(1-p)^{n-i}-\sum_{i=0}^{c_1}\binom{n}{i}p^i(1-p)^{n-i}\right]}$$

(6)

Here in equation 5,

$$p_1=\sum_{i=0}^{c_1}\binom{n}{i}p^i(1-p)^{n-i}$$

$$p_2=\sum_{i=0}^{c_2}\binom{n}{i}p^i(1-p)^{n-i}$$

$$p_3=1-p_1-p_2$$

where '*p*' is the failure probability. These failure probabilities are the cumulative distribution function of the life time distributions. The following are the life time distributions used in this chapter to determine the sample size with the help of repetitive group sampling plan.

By fixing the time termination ratios t/σ_0 as 0.628, 0.912, 1.257, 1.571, 2.356, 3.141, 3.927 and 4.712, the consumer's risk β as 0.25, 0.10, 0.05, and 0.01 and the mean ratios σ/σ_0 = 2, 4, 6, 8, 10 and 12, one can find the size of the first sample size n by substituting the failure probability p in the equations (5) and (6) and using the following inequality.

$L(p) \leq \beta$

The sample size generated using repetitive group sampling plan for the Weibull distribution, exponentiated Weibull distribution, Burr XII distribution, generalized exponential distribution, are presented in the Tables 1 – 4 respectively and their corresponding operating characteristic values are presented in the Tables 5 – 8 respectively.

4. NOTATION

g	-	Number of groups	σ	-	Scale parameter
r	-	Number of items in a group	α	-	Producer's risk
n	-	Sample size	β	-	Consumer's risk
c	-	Acceptance number	*p*	-	Failure probability
t_0	-	Termination time	L(*p*)	-	Probability of acceptance
a	-	Test termination time multiplier	μ	-	Mean life
			μ_0	-	Specified life
γ	-	Shape parameter			

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Table 1: Minimum sample size *n* for CRGS plan when the lifetime of the items follows the Weibull distribution

B	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712
0.25	0	1	4	2	1	1	1	1	1	1
	0	2	4	2	2	2	2	2	2	2
	0	3	4	3	3	3	3	3	3	3
	0	4	4	4	4	4	4	4	4	4
0.10	0	1	6	3	2	1	1	1	1	1
	0	2	6	3	2	2	2	2	2	2
	0	3	6	3	3	3	3	3	3	3
	0	4	6	4	4	4	4	4	4	4
0.05	0	1	8	4	2	2	1	1	1	1
	0	2	8	4	2	2	2	2	2	2
	0	3	8	4	3	3	3	3	3	3
	0	4	8	4	4	4	4	4	4	4
0.01	0	1	12	6	3	2	1	1	1	1
	0	2	12	6	3	2	2	2	2	2
	0	3	12	6	3	3	3	3	3	3
	0	4	12	6	4	4	4	4	4	4

Table 2: Minimum sample size *n* for CRGS plan when the lifetime of the items follows the exponentiated Weibull distribution

β	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712

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0.25	**0**	**1**	14	4	2	1	1	1	1	1
	0	**2**	14	4	2	2	2	2	2	2
	0	**3**	14	4	3	3	3	3	3	3
	0	**4**	14	4	4	4	4	4	4	4
0.10	**0**	**1**	21	6	3	2	1	1	1	1
	0	**2**	21	6	3	2	2	2	2	2
	0	**3**	22	6	3	3	3	3	3	3
	0	**4**	22	6	4	4	4	4	4	4
0.05	**0**	**1**	27	8	4	2	1	1	1	1
	0	**2**	27	8	4	2	2	2	2	2
	0	**3**	27	8	4	3	3	3	3	3
	0	**4**	28	8	4	4	4	4	4	4
0.01	**0**	**1**	42	11	5	3	1	1	1	1
	0	**2**	42	11	5	3	2	2	2	2
	0	**3**	42	11	5	3	3	3	3	3
	0	**4**	42	11	5	4	4	4	4	4

Table 3: Minimum sample size *n* for CRGS plan when the lifetime of the items follows the Burr XII distribution

β	**c_1**	**c_2**	**t/σ_0**							
			0.628	**0.942**	**1.257**	**1.571**	**2.356**	**3.141**	**3.927**	**4.712**
0.25	**0**	**1**	3	2	1	1	1	1	1	1
	0	**2**	3	2	2	2	2	2	2	2

	0	**3**	3	3	3	3	3	3	3	3
	0	**4**	4	4	4	4	4	4	4	4
0.10	**0**	**1**	4	2	2	1	1	1	1	1
	0	**2**	4	2	2	2	2	2	2	2
	0	**3**	4	3	3	3	3	3	3	3
	0	**4**	4	4	4	4	4	4	4	4
0.05	**0**	**1**	5	3	2	2	1	1	1	1
	0	**2**	5	3	2	2	2	2	2	2
	0	**3**	5	3	3	3	3	3	3	3
	0	**4**	5	4	4	4	4	4	4	4
0.01	**0**	**1**	7	4	3	2	2	1	1	1
	0	**2**	7	4	3	2	2	2	2	2
	0	**3**	7	4	3	3	3	3	3	3
	0	**4**	7	4	4	4	4	4	4	4

Table 4: Minimum sample size *n* for CRGS plan when the lifetime of the items follows the generalized exponential distribution

β	**c_1**	**c_2**	**t/σ_0**							
			0.628	**0.942**	**1.257**	**1.571**	**2.356**	**3.141**	**3.927**	**4.712**
0.25	**0**	**1**	7	4	3	2	1	1	1	1
	0	**2**	7	4	3	2	2	2	2	2
	0	**3**	7	4	3	3	3	3	3	3
	0	**4**	7	4	4	4	4	4	4	4

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0.10	**0**	**1**	10	6	4	3	2	2	2	2
	0	**2**	10	6	4	3	2	2	2	2
	0	**3**	10	6	4	3	3	3	3	3
	0	**4**	10	6	4	4	4	4	4	4
0.05	**0**	**1**	13	7	5	4	2	2	1	1
	0	**2**	13	7	5	4	2	2	2	2
	0	**3**	13	7	5	4	3	3	3	3
	0	**4**	13	7	5	4	4	4	4	4
0.01	**0**	**1**	19	10	7	5	3	2	2	2
	0	**2**	19	10	7	5	3	2	2	2
	0	**3**	19	10	7	5	3	3	3	3
	0	**4**	19	10	7	5	4	4	4	4

Table 5: Probability of acceptance for CRGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the Weibull distribution.

β	**t/σ_0**	**n**	**σ/σ_0**					
			2	**4**	**6**	**8**	**10**	**12**
0.25	**0.628**	**4**	**0.861591**	**0.990456**	**0.998078**	**0.999392**	**0.999751**	**0.99988**
	0.912	**2**	**0.833261**	**0.988292**	**0.997575**	**0.999232**	**0.999685**	**0.999848**
	1.257	**2**	**0.603397**	**0.964844**	**0.992349**	**0.997567**	**0.999002**	**0.999519**
	1.571	**2**	**0.36682**	**0.921287**	**0.981518**	**0.994084**	**0.997569**	**0.998826**
	2.356	**2**	**0.066195**	**0.727029**	**0.912533**	**0.970719**	**0.987813**	**0.994089**
	3.141	**2**	**0.007257**	**0.506313**	**0.764517**	**0.912567**	**0.962408**	**0.981542**
	3.927	**2**	**0.000448**	**0.349085**	**0.561793**	**0.808556**	**0.912506**	**0.955976**
	4.712	**2**	**1.51E-05**	**0.256469**	**0.367042**	**0.666204**	**0.833021**	**0.912533**
0.10	**0.628**	**6**	**0.728014**	**0.978622**	**0.995672**	**0.99863**	**0.999439**	**0.99973**

	0.912	3	0.681483	0.973824	0.994545	0.99827	0.999291	0.999658
	1.257	2	0.603397	0.964844	0.992349	0.997567	0.999002	0.999519
	1.571	2	0.36682	0.921287	0.981518	0.994084	0.997569	0.998826
	2.356	2	0.066195	0.727029	0.912533	0.970719	0.987813	0.994089
	3.141	2	0.007257	0.506313	0.764517	0.912567	0.962408	0.981542
	3.927	2	0.000448	0.349085	0.561793	0.808556	0.912506	0.955976
	4.712	2	1.51E-05	0.256469	0.367042	0.666204	0.833021	0.912533
0.05	0.628	8	0.592632	0.962348	0.992304	0.997562	0.999002	0.999519
	0.912	4	0.535544	0.954037	0.990309	0.996923	0.998739	0.999392
	1.257	2	0.603397	0.964844	0.992349	0.997567	0.999002	0.999519
	1.571	2	0.36682	0.921287	0.981518	0.994084	0.997569	0.998826
	2.356	2	0.066195	0.727029	0.912533	0.970719	0.987813	0.994089
	3.141	2	0.007257	0.506313	0.764517	0.912567	0.962408	0.981542
	3.927	2	0.000448	0.349085	0.561793	0.808556	0.912506	0.955976
	4.712	2	1.51E-05	0.256469	0.367042	0.666204	0.833021	0.912533
0.01	0.628	12	0.374996	0.918006	0.982732	0.994511	0.997752	0.998917
	0.912	6	0.317783	0.900783	0.978296	0.993073	0.997159	0.99863
	1.257	3	0.382952	0.923239	0.982858	0.994528	0.997754	0.998916
	1.571	2	0.36682	0.921287	0.981518	0.994084	0.997569	0.998826
	2.356	2	0.066195	0.727029	0.912533	0.970719	0.987813	0.994089
	3.141	2	0.007257	0.506313	0.764517	0.912567	0.962408	0.981542
	3.927	2	0.000448	0.349085	0.561793	0.808556	0.912506	0.955976
	4.712	2	1.51E-05	0.256469	0.367042	0.666204	0.833021	0.912533

Table 6: Probability of acceptance for CRGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the exponentiated Weibull distribution

β	t/σ_0	n	σ/σ_0					
			2	4	6	8	10	12
0.25	0.628	14	0.984621	0.999931	0.999997	1	1	1
	0.912	4	0.974281	0.999864	0.999994	0.999999	1	1
	1.257	2	0.95154	0.999686	0.999986	0.999999	1	1
	1.571	2	0.812071	0.998322	0.999923	0.999992	0.999999	1
	2.356	2	0.225841	0.970541	0.998301	0.999808	0.999966	0.999992
	3.141	2	0.027124	0.839338	0.98617	0.998302	0.999686	0.999923

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	3.927	2	0.001757	0.60338	0.936871	0.991259	0.998299	0.99957
	4.712	2	6.01E-05	0.39799	0.812287	0.968637	0.993494	0.998301
0.10	0.628	21	0.965731	0.999845	0.999994	0.999999	1	1
	0.912	6	0.943266	0.999694	0.999987	0.999999	1	1
	1.257	3	0.895735	0.999294	0.999969	0.999997	0.999999	1
	1.571	2	0.812071	0.998322	0.999923	0.999992	0.999999	1
	2.356	2	0.225841	0.970541	0.998301	0.999808	0.999966	0.999992
	3.141	2	0.027124	0.839338	0.98617	0.998302	0.999686	0.999923
	3.927	2	0.001757	0.60338	0.936871	0.991259	0.998299	0.99957
	4.712	2	6.01E-05	0.39799	0.812287	0.968637	0.993494	0.998301
0.05	0.628	27	0.944162	0.999743	0.99999	0.999999	1	1
	0.912	8	0.902282	0.999456	0.999977	0.999998	1	1
	1.257	4	0.825935	0.998743	0.999945	0.999994	0.999999	1
	1.571	2	0.812071	0.998322	0.999923	0.999992	0.999999	1
	2.356	2	0.225841	0.970541	0.998301	0.999808	0.999966	0.999992
	3.141	2	0.027124	0.839338	0.98617	0.998302	0.999686	0.999923
	3.927	2	0.001757	0.60338	0.936871	0.991259	0.998299	0.99957
	4.712	2	6.01E-05	0.39799	0.812287	0.968637	0.993494	0.998301
0.01	0.628	42	0.872605	0.999378	0.999975	0.999997	1	1
	0.912	11	0.827332	0.998971	0.999957	0.999996	0.999999	1
	1.257	5	0.748701	0.998035	0.999915	0.999991	0.999998	1
	1.571	3	0.648252	0.996219	0.999826	0.999982	0.999997	0.999999
	2.356	2	0.225841	0.970541	0.998301	0.999808	0.999966	0.999992
	3.141	2	0.027124	0.839338	0.98617	0.998302	0.999686	0.999923
	3.927	2	0.001757	0.60338	0.936871	0.991259	0.998299	0.99957
	4.712	2	6.01E-05	0.39799	0.812287	0.968637	0.993494	0.998301

Table 7: Probability of acceptance for CRGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the Burr XII distribution

β	t/σ_0	n	σ/σ_0					
			2	4	6	8	10	12
0.25	0.628	3	0.750811	0.97962	0.995733	0.998641	0.999442	0.999731
	0.912	2	0.596153	0.958534	0.990595	0.996975	0.998753	0.999396
	1.257	2	0.32774	0.889457	0.971257	0.990566	0.996082	0.998098

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	1.571	2	0.167139	0.788433	0.933913	0.977564	0.990571	0.995399
	2.356	2	0.031713	0.519837	0.747317	0.899515	0.955224	0.977582
	3.141	2	0.006973	0.35008	0.49644	0.747394	0.87464	0.93399
	3.927	2	0.001803	0.262262	0.293874	0.557663	0.747256	0.856234
	4.712	2	0.000543	0.216245	0.16726	0.385336	0.595763	0.747317
0.10	0.628	4	0.620863	0.964084	0.992416	0.997583	0.999007	0.999521
	0.912	2	0.596153	0.958534	0.990595	0.996975	0.998753	0.999396
	1.257	2	0.32774	0.889457	0.971257	0.990566	0.996082	0.998098
	1.571	2	0.167139	0.788433	0.933913	0.977564	0.990571	0.995399
	2.356	2	0.031713	0.519837	0.747317	0.899515	0.955224	0.977582
	3.141	2	0.006973	0.35008	0.49644	0.747394	0.87464	0.93399
	3.927	2	0.001803	0.262262	0.293874	0.557663	0.747256	0.856234
	4.712	2	0.000543	0.216245	0.16726	0.385336	0.595763	0.747317
0.05	0.628	5	0.502602	0.944621	0.988162	0.996221	0.998448	0.999251
	0.912	3	0.375403	0.910063	0.978961	0.993197	0.997192	0.998641
	1.257	2	0.32774	0.889457	0.971257	0.990566	0.996082	0.998098
	1.571	2	0.167139	0.788433	0.933913	0.977564	0.990571	0.995399
	2.356	2	0.031713	0.519837	0.747317	0.899515	0.955224	0.977582
	3.141	2	0.006973	0.35008	0.49644	0.747394	0.87464	0.93399
	3.927	2	0.001803	0.262262	0.293874	0.557663	0.747256	0.856234
	4.712	2	0.000543	0.216245	0.16726	0.385336	0.595763	0.747317
0.01	0.628	7	0.322488	0.895631	0.976905	0.992592	0.996955	0.99853
	0.912	4	0.233814	0.848656	0.962944	0.987922	0.995007	0.997583
	1.257	3	0.151044	0.777167	0.936901	0.978896	0.991195	0.99572
	1.571	2	0.167139	0.788433	0.933913	0.977564	0.990571	0.995399
	2.356	2	0.031713	0.519837	0.747317	0.899515	0.955224	0.977582
	3.141	2	0.006973	0.35008	0.49644	0.747394	0.87464	0.93399
	3.927	2	0.001803	0.262262	0.293874	0.557663	0.747256	0.856234
	4.712	2	0.000543	0.216245	0.16726	0.385336	0.595763	0.747317

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Table 8: Probability of acceptance for RGS plans with c_1 = 0 and c_2 = 2 when the lifetime of the items follows the generalized exponential distribution

β	t/σ_0	n	σ/σ_0					
			2	4	6	8	10	12
0.25	0.628	7	0.771745	0.97813	0.995163	0.998395	0.999324	0.999667
	0.912	4	0.718534	0.969094	0.992728	0.997532	0.998945	0.999477
	1.257	3	0.633734	0.95306	0.988173	0.995896	0.998223	0.999111
	1.571	2	0.660703	0.956004	0.988236	0.995841	0.998178	0.99908
	2.356	2	0.338338	0.857034	0.952484	0.982185	0.991939	0.995845
	3.141	2	0.157723	0.723085	0.882272	0.9525	0.977704	0.988249
	3.927	2	0.072756	0.592273	0.780348	0.90308	0.95247	0.974313
	4.712	2	0.033683	0.484747	0.660859	0.834574	0.914595	0.952484
0.10	0.628	10	0.614616	0.955957	0.990131	0.996721	0.998618	0.999321
	0.912	6	0.517474	0.932219	0.983679	0.994442	0.997624	0.998821
	1.257	4	0.480925	0.918688	0.979059	0.992706	0.99684	0.998418
	1.571	3	0.446134	0.90483	0.973741	0.990656	0.995899	0.997929
	2.356	2	0.338338	0.857034	0.952484	0.982185	0.991939	0.995845
	3.141	2	0.157723	0.723085	0.882272	0.9525	0.977704	0.988249
	3.927	2	0.072756	0.592273	0.780348	0.90308	0.95247	0.974313
	4.712	2	0.033683	0.484747	0.660859	0.834574	0.914595	0.952484
0.05	0.628	13	0.475468	0.927127	0.983357	0.994455	0.997662	0.998851
	0.912	7	0.433296	0.909413	0.977844	0.992436	0.996765	0.998395
	1.257	5	0.359856	0.877365	0.967484	0.988613	0.99506	0.997526
	1.571	4	0.294236	0.840415	0.953896	0.983432	0.99271	0.996316
	2.356	2	0.338338	0.857034	0.952484	0.982185	0.991939	0.995845
	3.141	2	0.157723	0.723085	0.882272	0.9525	0.977704	0.988249
	3.927	2	0.072756	0.592273	0.780348	0.90308	0.95247	0.974313
	4.712	2	0.033683	0.484747	0.660859	0.834574	0.914595	0.952484
0.01	0.628	19	0.279062	0.853941	0.964793	0.988167	0.995002	0.997543
	0.912	10	0.253021	0.828333	0.955375	0.984594	0.993395	0.996721
	1.257	7	0.202548	0.78135	0.937532	0.977779	0.990322	0.995148
	1.571	5	0.195475	0.768458	0.929224	0.974227	0.98862	0.994242
	2.356	3	0.158156	0.721298	0.897666	0.960464	0.981945	0.990663

	3.141	**2**	**0.157723**	**0.723085**	**0.882272**	**0.9525**	**0.977704**	**0.988249**
	3.927	**2**	**0.072756**	**0.592273**	**0.780348**	**0.90308**	**0.95247**	**0.974313**
	4.712	**2**	**0.033683**	**0.484747**	**0.660859**	**0.834574**	**0.914595**	**0.952484**

5. **EXAMPLE**

A Assume that an experimenter wants to establish that the lifetime of the AC adapter produced in the factory ensures that the true unknown mean life is at least 1000 hours. It is desired to stop the experiment at 628 hours. It is assumed that c_1 = 0, c_2 = 2 and β = 0.25. Based on consumer's risk values and the time termination ratio, the minimum sample size is determined using the repetitive group acceptance sampling plan for truncated life test. Following are the results obtained when the lifetime of the test items follows the Weibull, exponentiated Weibull, Burr XII, and the generalized exponential distribution, respectively.

Minimum sample size and the probability of acceptance for different lifetime distributions when c_1 = 0, c_2 = 2 and β = 0.25

Lifetime distribution	***n***	***L(p)***
Weibull	4	0.861591
Exponentiated Weibull	14	0.984621
Burr XII	3	0.750811
Generalized exponential	7	0.771745

From all the above distributions one can see that Weibull distribution is comparatively better than the other life time distribution in case of sample sizes and the probability of acceptance (n = 4 and $L(p)$ = 0.861591) when the repetitive group sampling plan is used (from Tables 1 to 4).

6. Conclusion

It is observed that the sample size decreases as the time termination ratio increases. Moreover the operating characteristic values increases when the quality improves. This sampling plan can be suggested for the industrial purposes to save time and cost of the life test experiments.

7. References:

[1] Sherman R.E. (1965). Design and evaluation of repetitive group sampling plan, Technometrics, Vol. 7, pp. 11-21.

[2] Soudararajan V. and Ramasamy M. M. (1984). Designing repetitive group sampling (RGS) plan indexed by AQL and LQL: ZAPQR Transactions, Vol. 9(1), 9-14.

[3] Govindaraju, K. (1987), An interesting observations in Acceptance Sampling. Economic Quality Control Journal, 2(4), pp.89-92.

[4] Shankar, G. & Mohapatra B.N. (1993), GERT analysis of conditional repetitive group sampling plan. ZJQRM, Vol.10(2), 50-62.

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

[5] Park H., Moon Y., Jun C.H., Balamurali S., Lee J. (2004). A variables repetitive group sampling plan for minimizing average sample number. Journal of the Korean Institute of Industrial Engineers 30 (3), 205–212.

[6] Jun C.H., Balamurali S., Lee S.H. (2006). Variables sampling plans for Weibull distributed lifetimes under sudden death testing. IEEE Transactions on Reliability, 55 (1), 53 – 58.

[7] Muhammad Aslam, Debasis Kunda, Munir Ahmad (2010). Time truncated acceptance sampling plans for generalized exponential distribution, Journal of Applied Statistics, Vol. 37, No. 4, 555-566.

[8] Mughal A. R., Muhammad Hanif, Munir Ahmad, Abdur Rehman (2011), Economic reliability acceptance sampling plans from truncated life tests based on the Burr Type XII percentiles, Pak. J. Commer. Soc. Sci., Vol. 5(1), 166-176.

[9] Muhammad Aslam, S. T. A. Niaki, M. Rasool and M. S. Fallahnezhad (2012). Decision rule of repetitive acceptance sampling plans assuring percentile life, Scientia Iranica, Transaction E: Industrial Engineering.