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Certain Studies on Acceptance Sampling Plans for Percentiles Based on the Modified Weibull Distribution

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Abstract

Acceptance Sampling plays a very important role in industry for monitoring process and evaluating complains. In this article, a new designing approach is followed under truncated life testing based on the percentiles for Modified Weibull Distribution (MWD). The OC curve and its associated risks were obtained for the specified percentile life. The ratio for the basic quality levels were carried out based on the percentile and specified percentile life. The Producer risk is fixed at 5% level and their ratio ensure the sampling plan values and its users. Suitable tables were developed for the plan parameter for the effective use of the end user's.

Keywords: Acceptance sampling, producer's risk, truncated life test, operating characteristic curve.

INTRODUCTION

In today's modern era quality plays an important role in maintaining quality product in industry, Quality can be evaluated by statistical monitoring of the process or acceptance sampling. According to Dodge and Romig (1929), Acceptance sampling (AS) technique is a methodology in which the decision is made whether to accept or reject a lot based on the sample inspection. Acceptance sampling can be classified as attribute sampling plan and variable sampling plan. If a decision is made on the quality of the product the sampling plan can applied is said to be attribute acceptance sampling plan and when it is based on the products mean and variance the acceptance sampling plan adopted is said to be variable acceptance sampling plan. In this context the quality characteristic of lifetime of the product then the sampling plan is said to be reliability sampling plan or acceptance sampling plan used for life testing. If the lifetime of the product represents the quality characteristics, the acceptance sampling is as follows an illustration: a company receives a shipment of product from a seller. This product is often a component or raw material used in the company's manufacturing process. A sample is taken from the lot and the relevant quality characteristic of the units in the sample is inspected. On the basis of the information in the sample, a decision is made regarding lot temperament. Traditionally, when the life test suggests that the mean life of products exceeds the specified one, the lot of products is accepted, otherwise it is rejected. Accepted lots are put into production, while rejected lots may be returned to the seller or may be subjected to some other lot disposition actions. For the purpose of shortening the test time and cost, a truncated life test may be conducted to determine the sample size to ensure a certain mean life of products when the life test is terminated at a time t_0, and the number of failures does not exceed a given acceptance number c. A common practice in life testing is to terminate the life test by a predetermined time t_0 and note the number of failures. One of the objectives of these experiments is to set a lower confidence limit on the mean life. It is then to establish a specified mean life with a given probability of at least $p*$ which provides protection to consumers. The test may be terminated before the time is reached or when the number of failures exceeds the acceptance number c in which case the decision is to reject the lot.

Studies regarding truncated life tests can be found in Epstein [1], Sobel and Tischendrof [2], Goode and Kao [3], Gupta and Groll [4], Gupta [5], Fertig and Mann [6], Kantam and Rosaiah [7], Baklizi [8],Wu and Tsai [9], Rosaiah and Kantam [10], Rosaiah et al. [11], Tsai and Wu [12], Balakrishnan et al. [13], Srinivasa Rao et al. [14], Srinivasa Rao et al. [15], Aslam et al. [16], and Srinivasa Rao et al. [17]. All these authors developed acceptance sampling plans based on the mean life time under a truncated life test. In contrast, Lio et al. [18] considered acceptance sampling plans for percentiles using truncated life tests and assuming Birnbaum-Saunders distribution. Srinivasa Rao and Kantam [19] developed similar plans for the percentiles of log-logistic distribution. Balakrishnan et al. [20], Rao and Kantam [21], Roa et al. [22] and Rao [23] developed the Acceptance Sampling plans based on percentiles for truncated life tests. Percentiles are taken into account because lesser percentiles provide more information than mean life regarding the life distribution. The 50^{th} percentile is the median which is equivalent to the mean life. So, literatures prove this as the generalization of acceptance sampling plans based on the mean life of products.

Percentile is the most appropriate average for decision making rather than mean and median in case of skewed lifetime distributions and more generalized measure in case of symmetrical distributions. This motivated the researcher to develop truncated life test plans based on the percentiles.

Ammar et al [24] introduce a new three-parameter distribution function called as modified Weibull distribution(MWD) with three parameters α, β, γ and it will be denoted as MWD(α, β, γ). It is observed that the MWD(α, β, γ) has decreasing or unimodal PDF and it can have increasing (starting from the value of α), decreasing and constant hazard functions.

In this paper the life time of the product is assumed to follow Modified Weibull Distribution. Operating characteristic (OC), producer's risk and Examples based on real fatigue life data sets are provided for an illustration.

2. The Modified Weibull Distribution

The Cumulative Distribution Function (CDF) of the MWD (α, β, γ) takes the following Percentile form

$$F(t;\alpha,\beta,\gamma) = 1 - e^{-\alpha t-\beta t^{\gamma}}, t > 0, \qquad \ldots (1)$$

Where $\alpha, \beta \geq 0, \gamma > 0$ such that $\alpha + \beta > 0$. Here α is a scale parameter, while β and γ are shape parameters.

The Probability Distribution Function (PDF) of MWD (α, β, γ) is

$$f(t;\alpha,\beta,\gamma) = (\alpha + \beta\gamma t^{\gamma-1})e^{-\alpha t-\beta t^{\gamma}}, t > 0, \qquad \ldots (2)$$

And the hazard function of MWD (α, β, γ) is

$$h(t;\alpha,\beta,\gamma) = \alpha + \beta\gamma t^{\gamma-1},\ t > 0,) \qquad \ldots (3)$$

When γ=2, the quantile function is

$$t_q = \frac{1}{2\beta}\{-\alpha + \sqrt{\alpha^2 - 4\beta\ln(1-q)}\}$$

The t_q is increases as q increases. Let $\eta = \sqrt{-4\beta\ln(1-q)}$

t_q and q are directly proportional. Let,

$$t_q = \frac{1}{2\beta}\eta$$

$$\Rightarrow \beta = \frac{1}{2t_q}\eta$$

Letting $\frac{t}{t_q} = \delta$

$$F(t;\eta,\delta) = 1 - e^{\left(-\delta^2\eta^2\right)}; t > 0. \qquad \ldots(4)$$

3. DEVELOPMENT OF THE ACCEPTANCE SAMPLING PLANS

Assume that a common practice in life testing is to terminate the life test by pre-settled time t, the probability of rejecting a bad lot be at least $p*$, and the maximum number of allowable bad items to accept the lot be c. The acceptance sampling plan for percentiles under a truncated life test is to set up the minimum sample size n for this given acceptance number c such that the consumer's risk, the probability of accepting a bad lot, does not exceed 1- $p*$. A bad lot means that the true $100q^{th}$ percentile, t_q below the specified percentile t_q^0. Thus, the probability $p*$ is a confidence level in the sense that the chance of rejecting a bad lot with $t_q > t_q^0$ is at least equal to $p*$. Therefore, for a given $p*$, the proposed acceptance sampling plan can be characterized by the triplet $(n, c, t/t_q^0)$.

3.1 Minimum Sample Size

ASSP is an inspection procedure used to determine whether to accept or reject a specific lot. Since the success and failure are experienced in frequent mode and also of larger sized lots the parameter is said to follow binomial distribution with parameter (n, c, p). Assumptions for the construction of ASP through MWD percentiles are,

(1) Let the proposed single sampling plan procedure is said to follow binomial distribution with parameter (n, c, p).

(2) Let p be the failure probability observed during specified time t is obtained through, $p = F(t;\delta_0)$

(3) Let c be the acceptance number that is, if the number of failures is less than c for the specified time t we accept the lot and also we have,

$$F(t;\delta) \le F(t;\delta_0) \Leftrightarrow t_q \ge t_{q_0}$$

SSP is the basic for all acceptance sampling. For an SSP, one sample of items is selected at random from a lot and the disposition of the lot is determined from the resulting information. These plans are also denoted as (n, c) plans since there are n observations and the lot is rejected if there are more than c defectives. Since the output is conforming or non-conforming, SSP follows binomial distribution denoted by B (n, c, p).

The procedure is to develop single sampling plan whose parameter p is assumed to follow MWD with parameter $\delta_0=t/t_q^0$. Where, t and t_q^0 are the specified test duration and specified 100qth percentile of the MWD respectively.

According to Cameron (1952), see [4] the smallest size n can be obtained by satisfying,

$$\sum_{i=0}^{c}\binom{n}{i}p^{i}(1-p)^{n-i}\leq 1-p^{*}$$

Where p^* is the probability of rejecting a bad lot and $(1-p^*)$ is the consumer's risk. Since $p=F(t, \delta_0)$ depends on δ_0, it is sufficient to specify δ_0.

3.2 Operating Characteristic Function and Producer's Risk

The operating characteristic function of the sampling plan $B(n, c, p)$ gives the probability of accepting the lot $L(p)$ with

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

The producer's risk (α) is the probability of rejecting a lot when $t_q > t_q^0$. And for the given producer's risk (α), p as a function of d_q should be evaluated from the condition given by Cameron (1952) as

$$\sum_{i=0}^{c}\binom{n}{i}p^{i}(1-p)^{n-i}\geq 1-\alpha$$

Where $p=F(t,\delta_0)$ and $F(.)$ can be obtained as a function of d_q. For the sampling plan developed, the $d_{0.1}$ values are obtained at the producer's risk $\alpha=0.05$.

Construction of Tables

Step 1: Find the value of η for $\alpha=0$ and $q=0.1$.

Step 2: Set the evaluated η, $c=1$ and t/t_q= 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8 and 0.9.

Step 3: Find the smallest value of n satisfying $\sum_{i=0}^{c}\binom{n}{i}p^{i}(1-p)^{n-1}\leq 1-p^{*}$ where p^* is the probability of rejecting the bad lot.

Step 4: For the n value obtained find the ratio $d_{0.1}$ such that $\sum_{i=0}^{c}\binom{n}{i}p^{i}(1-p)^{n-1}\geq 1-\alpha$

where, $\alpha=0.05$, $p=F(\frac{t}{t_{q_0}}.\frac{1}{d_q})$ and $d_q=t_{q_0}/t_q$

4. ILLUSTRATIVE EXAMPLES

Example

Suppose $\gamma=2$, $t=20$hrs, $t_{0.1}$=50hrs, $c=1$, $\alpha = 0.05$, $\beta=0.01$, Then, η =0.6491 is calculated from the equation derived under percentile estimator and the ratio, $t/t_{0.1}=0.4$ and from Table 2 the minimum sample size suitable for the given information is found to be as $n=42$ and the respective $L(p)$ values for the Acceptance sampling plan (n, c, $t/t_{0.1}$) = (42, 1, 0.01) with $p^* = 0.75$ under WPD from Table 4 are,

Table 4: (n, c, $t/t_{0.1}$) = (42, 1, 0.01) with $p^* = 0.75$ under MWD

$t_{0.1}/t_{0.1}^0$	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75
$L(p)$	0000	0.0001	0.0413	0.2314	0.4655	0.6469	0.7674	0.8443	0.8934	0.9252	0.9463

This shows that if the actual 10th percentile is equal to the required 10th percentile ($t_{0.1}/t_{0.1}^0 = 1$) the producer's risk is approximately 0.7686(1- 0.2314). From Table 3, we get the values of $d_{0.1}$ for different choices of c and $t/t_{0.1}^0$in order to assert that the producer's risk is less than or equals 0.05. In this example, the value of $d_{0.1}$ should be 8 for c = 1, $t/t_{0.1}$=0.01 and p^* =0.95. This means the product can have a 10*th* percentile life of 8 times the required 10*th* percentile lifetime in order that under the above acceptance sampling plan the product is accepted with probability of at least 0.95.

Figure1. Shows the OC curves for the sampling plan (n ,c, $t/tq_{0.1}^0$) with $p^*=0.75$ for $\delta_0 =1$, where $c = 1$.

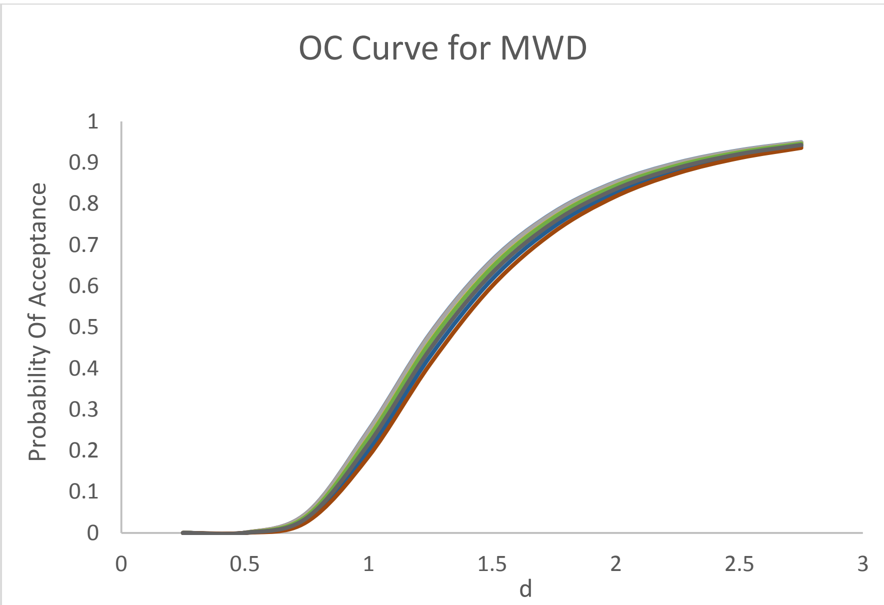

Table 2: Minimum ratio of true $d_{0.1}$ for the acceptability of a lot for the Modified Weibull Distribution and producer's risk of 0.05.

P^*	C	$t / d^{0}_{0.1}$								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.75	0	5.0919	5.1727	5.2894	5.3381	4.4923	5.4346	5.2855	5.5936	6.3091
	1	2.761	2.7664	2.7696	2.8133	2.8623	2.8171	2.9085	2.9542	2.8618
	2	2.1828	2.1891	2.1985	2.1974	2.2405	2.1886	2.2454	2.2218	2.3231
	3	1.9282	1.9535	1.9549	1.9535	1.9511	1.9818	2.0018	1.9584	1.9685
	4	1.7816	1.7816	1.7977	1.7984	1.7948	1.8199	1.8016	1.8111	1.8116
	5	1.6902	1.6912	1.6922	1.6985	1.6998	1.6972	1.7209	1.7452	1.7122
	6	1.6165	1.6173	1.6200	1.6219	1.6225	1.6229	1.6246	1.6198	1.6406
	7	1.5627	1.5636	1.5658	1.5668	1.5752	1.5696	1.5873	1.5728	1.6158
	8	1.5200	1.5184	1.5201	1.5206	1.5201	1.5248	1.5256	1.5326	1.5218
	9	1.4844	1.4851	1.4852	1.4878	1.4910	1.4999	1.4910	1.4877	1.4910
	10	1.4542	1.4557	1.4557	1.4576	1.4626	1.4639	1.4648	1.4765	1.4845
0.90	0	6.6928	6.6302	6.6252	6.6332	6.535	6.6405	6.9455	6.8566	6.777
	1	3.2983	3.2965	3.2977	3.2975	3.3302	3.3533	3.3627	3.3022	3.164
	2	2.5443	2.5477	2.5448	2.5484	2.5366	2.5764	2.511	2.5009	2.4961
	3	2.2072	2.2091	2.2108	2.2138	2.2106	2.1965	2.2147	2.1963	2.2576
	4	2.0115	2.0115	2.0137	2.0162	2.0139	1.9999	2.0192	1.9902	1.993
	5	1.8817	1.8812	1.8822	1.8822	1.8872	1.8875	1.8738	1.8851	1.8575
	6	1.7885	1.7892	1.79	1.7879	1.7892	1.7958	1.7882	1.7863	1.7912
	7	1.7177	1.7185	1.7187	1.7179	1.7241	1.7276	1.7253	1.7332	1.7171
	8	1.6622	1.6614	1.6632	1.6635	1.6599	1.6558	1.6625	1.6581	1.6792
	9	1.6169	1.6168	1.6169	1.6163	1.6208	1.6158	1.6242	1.6276	1.6122
	10	1.579	1.5793	1.5788	1.5809	1.5832	1.5748	1.5722	1.5809	1.5748
0.95	0	7.5681	7.6012	7.6132	7.5819	7.6763	7.6698	7.7277	7.5944	7.2444
	1	3.6416	3.6442	3.636	3.6502	3.6281	3.6595	3.6132	3.7423	3.5966
	2	2.7635	2.7639	2.7697	2.7643	2.7771	2.7529	2.7938	2.7503	2.8133
	3	2.3758	2.3752	2.3792	2.3848	2.378	2.3665	2.3791	2.4086	2.3674
	4	2.1517	2.1512	2.1567	2.1557	2.155	2.1657	2.1691	2.155	2.1596
	5	2.0083	2.0043	2.0022	2.0021	2.0019	2.0073	1.9965	1.988	2.0254
	6	1.8966	1.8969	1.897	1.8996	1.9025	1.8966	1.9076	1.8983	1.9041
	7	1.8158	1.816	1.8161	1.8188	1.8144	1.8145	1.8136	1.829	1.8378
	8	1.752	1.7523	1.7513	1.7522	1.7523	1.7509	1.753	1.7429	1.7648
	9	1.7002	1.7006	1.7015	1.6991	1.703	1.7008	1.7048	1.7031	1.7073
	10	1.6573	1.6573	1.6571	1.6589	1.6574	1.6586	1.6663	1.6577	1.6606
0.99	0	9.4021	9.3076	9.3784	9.3184	9.3554	9.3632	9.3345	9.4132	9.6448
	1	4.2742	4.2728	4.2994	4.2894	4.3284	4.2974	4.3372	4.3062	4.3172
	2	3.1815	3.182	3.1857	3.1763	3.2035	3.2122	3.2104	3.1896	3.2256
	3	2.6962	2.6951	2.6982	2.6929	2.6941	2.6929	2.7087	2.7143	2.7085
	4	2.417	2.4179	2.4191	2.4288	2.4103	2.4314	2.4184	2.4219	2.4223
	5	2.2332	2.2348	2.2329	2.226	2.2373	2.2376	2.2374	2.2351	2.2386
	6	2.1013	2.1016	2.1029	2.0935	2.0937	2.1027	2.1093	2.1019	2.1101
	7	2.0011	2.001	2.0019	2.0086	1.9941	2.0029	2.0081	2.0049	2.0156
	8	1.9222	1.9222	1.9217	1.9158	1.9166	1.9257	1.9199	1.9297	1.9221
	9	1.8513	1.8513	1.8597	1.8525	1.8603	1.8644	1.8541	1.8563	1.8664
	10	1.7986	1.7984	1.799	1.8066	1.8003	1.8072	1.8004	1.8089	1.8044

Table 2: Minimum ratio of true $d_{0.1}$ for the acceptability of a lot for the Modified Weibull Distribution and producer's risk of 0.05.

$P*$	C	$d_{0.1}/d_{0.1}^{0}$								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.75	0	5.0919	5.1727	5.2894	5.3381	4.4923	5.4346	5.2855	5.5936	6.3091
	1	2.761	2.7664	2.7696	2.8133	2.8623	2.8171	2.9085	2.9542	2.8618
	2	2.1828	2.1891	2.1985	2.1974	2.2405	2.1886	2.2454	2.2218	2.3231
	3	1.9282	1.9335	1.9349	1.9535	1.9511	1.9818	2.0018	1.9584	1.9655
	4	1.7816	1.7816	1.7977	1.7984	1.7948	1.8199	1.8016	1.8111	1.8116
	5	1.6902	1.6912	1.6922	1.6985	1.6998	1.6972	1.7209	1.7452	1.7122
	6	1.6165	1.6173	1.6200	1.6219	1.6225	1.6229	1.6246	1.6198	1.6405
	7	1.5627	1.5636	1.5658	1.5668	1.5752	1.5696	1.5873	1.5728	1.6158
	8	1.5200	1.5184	1.5201	1.5206	1.5201	1.5248	1.5256	1.5326	1.5218
	9	1.4844	1.4851	1.4852	1.4878	1.4910	1.4999	1.4910	1.4877	1.4910
	10	1.4542	1.4557	1.4557	1.4576	1.4626	1.4639	1.4646	1.4765	1.4845
0.90	0	6.6928	6.6302	6.6252	6.6532	6.535	6.6405	6.9455	6.8566	6.777
	1	3.2983	3.2965	3.2977	3.2975	3.3302	3.3533	3.3627	3.3022	3.164
	2	2.5443	2.5477	2.5448	2.5484	2.5366	2.5764	2.511	2.5009	2.4961
	3	2.2072	2.2091	2.2108	2.2138	2.2106	2.1965	2.2147	2.1963	2.2576
	4	2.0115	2.0115	2.0137	2.0162	2.0139	1.9999	2.0192	1.9902	1.993
	5	1.8817	1.8812	1.8822	1.8822	1.8872	1.8875	1.8738	1.8851	1.8575
	6	1.7885	1.7892	1.79	1.7879	1.7892	1.7958	1.7882	1.7863	1.7912
	7	1.7177	1.7185	1.7187	1.7179	1.7241	1.7276	1.7253	1.7332	1.7171
	8	1.6622	1.6614	1.6632	1.6635	1.6699	1.6558	1.6625	1.6581	1.6792
	9	1.6169	1.6168	1.6169	1.6163	1.6208	1.6158	1.6242	1.6276	1.6122
	10	1.579	1.5793	1.5788	1.5809	1.5832	1.5748	1.5722	1.5899	1.5748
0.95	0	7.5681	7.6012	7.6132	7.5819	7.6763	7.6698	7.7277	7.5944	7.2444
	1	3.6416	3.6442	3.636	3.6502	3.6281	3.6595	3.6132	3.7423	3.5966
	2	2.7635	2.7639	2.7697	2.7643	2.7771	2.7529	2.7938	2.7508	2.8133
	3	2.3758	2.3752	2.3792	2.3848	2.378	2.3665	2.3791	2.4086	2.3674
	4	2.1517	2.1512	2.1567	2.1557	2.155	2.1657	2.1691	2.155	2.1596
	5	2.0033	2.0043	2.0022	2.0021	2.0019	2.0073	1.9965	1.988	2.0254
	6	1.8966	1.8969	1.897	1.8996	1.9025	1.8966	1.9076	1.8983	1.9041
	7	1.8158	1.816	1.8161	1.8188	1.8144	1.8145	1.8136	1.829	1.8378
	8	1.752	1.7523	1.7513	1.7522	1.7523	1.7509	1.753	1.7429	1.7648
	9	1.7002	1.7005	1.7015	1.6991	1.703	1.7003	1.7048	1.7081	1.7073
	10	1.6573	1.6573	1.6571	1.6589	1.6574	1.6586	1.6653	1.6577	1.6605
0.99	0	9.4021	9.3076	9.3784	9.3184	9.3554	9.3632	9.3345	9.4132	9.6448
	1	4.2742	4.2728	4.2994	4.2894	4.3284	4.2974	4.3372	4.3062	4.3172
	2	3.1815	3.182	3.1857	3.1763	3.2035	3.2122	3.2104	3.1896	3.2256
	3	2.6962	2.6951	2.6982	2.6929	2.6941	2.6929	2.7037	2.7143	2.7085
	4	2.417	2.4179	2.4191	2.4288	2.4103	2.4314	2.4184	2.4219	2.4225
	5	2.2332	2.2348	2.2329	2.226	2.2373	2.2376	2.2374	2.2351	2.2386
	6	2.1013	2.1016	2.1029	2.0935	2.0937	2.1027	2.1093	2.1019	2.1101
	7	2.0011	2.001	2.0019	2.0036	1.9941	2.0029	2.0031	2.0049	2.0156
	8	1.9222	1.9222	1.9217	1.9158	1.9166	1.9257	1.9199	1.9297	1.9221
	9	1.8513	1.8513	1.8597	1.8525	1.8603	1.8644	1.8541	1.8563	1.8654
	10	1.7986	1.7984	1.799	1.8066	1.8003	1.8072	1.8004	1.8089	1.8044

Table 3: Operating Characteristic values of the sampling plan *(n, c* = 1*,* $t/t_q{}^{0}{}_{0.1}$*)* for a given $P*$ under Modified Weibull Distribution

P*	n	$t/t^{0}_{q_{0.1}}$	$t_{0.1}/tq^{0}_{0.1}$										
			0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75
0.75	640	0.01	0.0000	0.0002	0.048	0.2495	0.4855	0.6634	0.7797	0.8532	0.8998	0.9298	0.9497
	161	0.02	0.0000	0.0002	0.0473	0.2476	0.4834	0.6617	0.7785	0.8523	0.8991	0.9294	0.9493
	72	0.03	0.0000	0.0002	0.0469	0.2465	0.4822	0.6607	0.7777	0.8518	0.8987	0.9291	0.9491
	42	0.04	0.0000	0.0001	0.0413	0.2314	0.4655	0.6469	0.7674	0.8443	0.8934	0.9252	0.9463
	28	0.05	0.0000	0.0001	0.0357	0.2151	0.4470	0.6312	0.7556	0.8357	0.8871	0.9206	0.9429
	19	0.06	0.0000	0.0001	0.0409	0.2302	0.4642	0.6457	0.7665	0.8437	0.8929	0.9248	0.9460
	15	0.07	0.0000	0.0000	0.0310	0.2005	0.4296	0.6163	0.7442	0.8273	0.8810	0.9161	0.9396
	12	0.08	0.0000	0.0000	0.0265	0.1852	0.4108	0.5999	0.7315	0.8179	0.8741	0.9110	0.9358
	9	0.09	0.0000	0.0001	0.0361	0.2159	0.4475	0.6316	0.7558	0.8358	0.8872	0.9207	0.9429
0.90	924	0.01	0.0000	0.0000	0.0078	0.0998	0.2891	0.4840	0.6371	0.7456	0.8199	0.8705	0.9053
	231	0.02	0.0000	0.0000	0.0079	0.1003	0.2900	0.4849	0.6379	0.7462	0.8204	0.8708	0.9055
	103	0.03	0.0000	0.0000	0.0078	0.1001	0.2897	0.4846	0.6376	0.7460	0.8202	0.8707	0.9054
	58	0.04	0.0000	0.0000	0.0080	0.101	0.2911	0.486	0.6389	0.7470	0.8210	0.8713	0.9059
	38	0.05	0.0000	0.0000	0.0071	0.0952	0.2815	0.4761	0.6303	0.7403	0.8158	0.8674	0.9029
	27	0.06	0.0000	0.0000	0.0064	0.0902	0.2727	0.4668	0.6224	0.7339	0.8109	0.8636	0.9000
	20	0.07	0.0000	0.0000	0.0063	0.0898	0.2721	0.4661	0.6217	0.7334	0.8105	0.8633	0.8998
	15	0.08	0.0000	0.0000	0.0076	0.0987	0.2872	0.4819	0.6353	0.7442	0.8188	0.8696	0.9046
	11	0.09	0.0000	0.0000	0.0128	0.1281	0.3333	0.5280	0.6740	0.7743	0.8417	0.8869	0.9177
0.95	1125	0.01	0.0000	0.0000	0.0020	0.0501	0.1942	0.3780	0.5420	0.6681	0.7592	0.8237	0.8692
	282	0.02	0.0000	0.0000	0.0045	0.0755	0.2462	0.4382	0.5972	0.7137	0.7952	0.8516	0.8908
	125	0.03	0.0000	0.0000	0.0021	0.0509	0.1958	0.3799	0.5438	0.6696	0.7604	0.8246	0.8699
	71	0.04	0.0000	0.0000	0.0020	0.0496	0.1929	0.3763	0.5405	0.6668	0.7581	0.8228	0.8685
	45	0.05	0.0000	0.0000	0.0022	0.0523	0.1991	0.3838	0.5475	0.6727	0.7629	0.8266	0.8714
	32	0.06	0.0000	0.0000	0.0019	0.0486	0.1906	0.3735	0.5378	0.6645	0.7563	0.8214	0.8675
	23	0.07	0.0000	0.0000	0.0024	0.0543	0.2033	0.3889	0.5522	0.6766	0.7660	0.829	0.8733
	19	0.08	0.0000	0.0000	0.0014	0.0409	0.1723	0.3506	0.5157	0.6457	0.7412	0.8095	0.8581
	14	0.09	0.0000	0.0000	0.0025	0.0562	0.2074	0.3937	0.5567	0.6803	0.769	0.8313	0.8751
0.99	1552	0.01	0.0000	0.0000	0.0017	0.0456	0.1838	0.3652	0.5299	0.6578	0.7509	0.8172	0.8641
	388	0.02	0.0000	0.0000	0.0001	0.0109	0.0792	0.214	0.3711	0.5143	0.6302	0.7191	0.7857
	175	0.03	0.0000	0.0000	0.0000	0.0101	0.0757	0.208	0.3641	0.5074	0.6242	0.714	0.7815
	98	0.04	0.0000	0.0000	0.0001	0.0105	0.0775	0.2111	0.3677	0.5109	0.6273	0.7166	0.7836
	64	0.05	0.0000	0.0000	0.0000	0.0095	0.0729	0.2031	0.3583	0.5018	0.6192	0.7098	0.778
	44	0.06	0.0000	0.0000	0.0001	0.0103	0.0765	0.2094	0.3657	0.509	0.6255	0.7152	0.7824
	33	0.07	0.0000	0.0000	0.0000	0.0094	0.0722	0.2018	0.3567	0.5002	0.6178	0.7086	0.7771
	25	0.08	0.0000	0.0000	0.0001	0.0103	0.0762	0.2089	0.3651	0.5084	0.625	0.7147	0.7821
	20	0.09	0.0000	0.0000	0.0000	0.0099	0.0744	0.2057	0.3613	0.5047	0.6217	0.712	0.7798

5. CONCLUSIONS

This Paper has derived the acceptance sampling plans based on the Modified Weibull Distribution percentiles when the life test is truncated at a pre-fixed time. The procedure is provided to construct the proposed sampling plans for the percentiles of the Modified Weibull Distribution with known Parameter $\gamma=2$. To ensure that the life quality of products exceeds a specified one in terms of the life percentile, the acceptance sampling plans based on percentiles should be used. Also provides the sensitivity of the sampling plans in terms of the OC. The industrial Designer and the experimenter to adopt this plan in order to save the cost and time of the experiment. This plan can be further studied for many other distributions, various quality levels, various Risks'(s) and reliability characteristics as future research.

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