

## A Hybrid Group Acceptance Sampling Plans for life tests based on the New Weighted Exponential Distribution

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### ABSTRACT

*A mixed sampling scheme based on shorter life is provided in this study where the element life is a new weighted exponential distribution. The minimal number of testers and the number of acceptance requirements for distinct customers are defined for a particular team size. The risk and time to complete the test and the performance function value is calculated for different quality levels. The minimum ratio is derived from the risk from the actual average service life to the target service life, and the specific risk is borne by the specific manufacturer. Examples of the outcomes are shown.*

**Keywords:** new weighted exponential distribution, hybrid group acceptance sampling plans, consumer's risk, operating characteristic (OC) function, producer's risk, truncated life test.

**Mathematics Subject Classification:** 62N05, 62D05

**Computing Classification System:** Sequential Monte Carlo methods

### 1. INTRODUCTION

The decision to accept or reject a product depends on its availability. There are different types of quality control processes in quality control. One such process is the acceptance control plan. The sampling plan of acceptance is a strategy specifying the minimum sample size to employ. This is particularly significant if the product's quality depends on its shelf life. When developing a sampling design, it is often implicitly assumed that only one element will be included in the tester. Because articles can be tested at the same time, this can save time and testing costs. The objects with inside the tester may look like a collection, and the collection is referred to as group size for the variety of objects. The Group Acceptance Sampling Plan (GASP) is this form of item group. The minimum number of elements procedure is called the Hybrid Sampling Acceptance Plan for a certain numerical group (HGASP). When HGASP and the abbreviated life test are combined, based on the shorted life

test, HGASP is named, which presupposes that a given probability distribution is seen in the product's lifetime.

Studies regarding Acceptation plan for hybrid group (HGASP) of Shortened life test can be found in Srinivasa Rao (2011), Razzaque(2011), Ramaswamy and Anburajan(2012), Hussain et al (2012), Srinivasa Rao(2011), Subba Rao et al (2014), Rajagopal and Vijaya devi(2018), Sandeep Kumar(2019).

In this article, the proposed sample acceptance plan (HGASP) for the hybrid group is described based on a short life-test or a truncated lifetime test in which the product's life is in line with the new weighted exponential distribution in section 2. Performance (OC) and manufacturer's risk is presented in Section 3. Section 4 shows various examples, and a summary and conclusion is eventually offered in Section 5.

## 2. METHOD

### 2.1. The Hybrid Group Acceptance Sampling Plans (HGASP)

The probability function representing density (*pdf*) of the new weighted exponential distribution (NWED) is:

$$f(t; \alpha, \lambda) = (1 + \lambda) \alpha e^{-(1+\lambda)\alpha t}; \quad t > 0, \alpha > 0, \lambda > 0 \quad (2.1)$$

Its distribution function (*cdf*) is given through,

$$F(t; \alpha, \lambda) = 1 - e^{-(1+\lambda)\alpha t}; \quad t > 0, \alpha > 0, \lambda > 0 \quad (2.2)$$

Here, scaling parameter is  $\alpha$  and the form parameter is  $\lambda$ .

The survival functions of different parametric values of new weighted exponential distribution are given below:

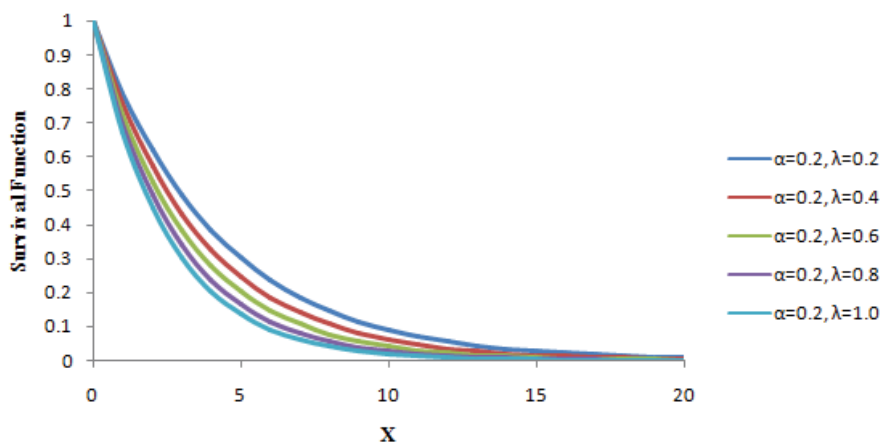


Figure 1. Survival Functions of NWED.

Assume a product's lifespan follows new weighted exponential distribution, and also  $\theta$  as parameter of scale. The cumulative function  $F(\cdot)$  of distribution is given by;

$$F(t) = F(t; \alpha, \lambda) = 1 - e^{-(1+\lambda)\alpha \frac{t}{\theta}} \quad (2.3)$$

For,  $0 < q < 1$ , the 100<sup>th</sup> percentile is formulated as;

$$t_q = \theta \left( \frac{-\log(1-q)}{(1+\lambda)\alpha} \right) \quad (2.4)$$

Representing  $\theta$  in the scaled form of Equation 2.3 we are getting;

$$F(t) = 1 - e^{\left(\frac{t}{t_q}\right) \log(1-q)} \quad (2.5)$$

$$F(t) = 1 - e^{\delta \log(1-q)} \quad (2.6)$$

Where  $\delta = \frac{t}{t_q}$ . In the case of endurance testing, it is customary to end the endurance test at a

specified time point  $t$ , requiring the probability of rejecting defective batches at least to be  $p^*$ , and to accept as many damaged items as possible. The Parcel is  $c$ . The percentage reduction Plan for sampling endurance testing specifies the sample size  $n$  for a certain acceptability number  $c$  is such that there is no risk that consumers may accept substandard batches  $(1 - p^*)$ . The huge difference means, the real 100<sup>th</sup> percentile,  $t_q$  is lower than the Percentile defined  $t_q^0$ . The opportunity to reject bad lots with  $t_q < t_q^0$  is equivalent to at least  $p^*$ , therefore the probability  $p^*$  is confidence. The

recommended sample plan thus may be defined by the notation  $(n, c, \delta) = \left( n, c, \frac{t}{t_q^0} \right)$ , for the

provided  $p^*$ . Where  $\delta = \frac{t}{t_q^0}$ .

For symmetrical distribution, both mean and median are obviously equal. But if the distribution is partial or biased, that signifies that tail is longer on one side, so it can be expected that the mean will face this side and the distribution will be biased. Due to the degree of asymmetry, we can increasingly determine the mean. In this instance, the population percentage below the average may become too large. This means that the average value is not centre of the distribution; over 80% data of the population may be less than the average value. However, if the median is used, the median will be less than only 50% of the population. Given that for our current prejudices, the average quality of life decisions is the median, not the average level of the population, so we have  $q=0.50$ . Therefore, we can conclude that a sample design based on the median population of the NWED is cheaper than a sample design based on the population average relative to the sample size.

Allow the median of a product life to be the actual value of  $\mu$  and the median stated is  $\mu_0$ , assuming that the element's life cycle follows the new weighted exponential distribution. Our interest is to check the hypothesis  $H_0 : \mu \geq \mu_0$  on the basis of failure data against  $H_1 : \mu < \mu_0$ . A set is seen as nice and acceptable for usage by consumers, if information on the sample supports the assumption  $\mu \geq \mu_0$ . On the opposite side, the product batch will be rejected, if  $\mu < \mu_0$ . On the pre-fixed time of sample failures this hypothesis is tested in sampling plans for approval (ASP). We are rejecting the lot, if the failure number is greater than  $c$ . If sufficient evidence is available that  $\mu \geq \mu_0$  has some consumer's risk, we may accept the lot or reject it otherwise.

On basis of the abbreviated life testing plan, let us propose the subsequent HGASP:

- Specify the number and allocate the  $r$  items testers to each  $g$  pre-set group, and for a lot the sample necessary is  $n = r * g$ .
- Pre-set approval  $c$  and time for the experiment  $t_0$  for every group.
- Accept lots, if each group is at most affected by  $c$  failures.
- Finish the experiment, if failures occur in more than  $c$  and disallow the lot.

We're looking forward to finding out the Testing Number  $r$  applicable for the new weighted exponential distribution, as well as different values of the number of acceptors  $c$ , group size  $g$  and completion time  $t_0$  suppose will happen. Since the completion time should be defined as numerous intermediate value  $\mu_0$  specified, let  $t_0 = \delta \mu_0$  for the constant given  $\delta$  (termination proportion). The chance that an excellent batch is rejected ( $\alpha$ ) is named as the manufacturer's opportunity, and the likelihood of a terrible lot ( $\beta$ ) is known as the risk to the Consumer. Identify the value of  $g$  sampling plan parameter suggested, to ensure that ( $\beta$ ) risk is borne by consumers. Consumer risk  $\beta$  is usually expressed in terms of consumer confidence. The level of trust (confidence) is  $p^*$ , and then  $\beta = 1 - p^*$  is the consumer opportunity. We are going to define the number of  $g$  groups in the sample scheme proposed, so that targeted  $\beta$  is not exceeded by the flood risk group. If you have enough of the data packet, we can adopt the binomial distribution to design HGASP. A batch of items is accepted solely according to HGASP only, if at least there are  $c$  errors in every  $g$  group. Then, the receptor probability is determined by the following expression:

$$\left( \sum_{i=0}^c \binom{r}{i} p_0^i (1 - p_0)^{r-i} \right)^g \leq \beta \quad (2.7)$$

Here  $p_0 = F_t(\delta_0)$  is probability that the time  $t = \delta t_q^0$  will fail. To be comfortable, small sample sizes for  $\beta = 0.25, 0.10, 0.05, 0.01$ ;  $g = 2(1)10$ ;  $c = 0(1)8$ ;  $\delta = 0.7, 0.8, 1.0, 1.2, 1.5, 2.0$  results only are shown in Table 1.

## 2.2. Operating characteristic of the sampling plan

The performance function (OC) of the sampling design can be stated as; the opportunity to accept might be regarded as a function of a departure from the given  $\mu_0$  value from their genuine  $\mu$  value.

After receiving the minimum number of  $r$  testers, if  $\mu \geq \mu_0$  or  $\frac{\mu}{\mu_0}$  is deemed to be of good quality, it is possible to determine the possibility of accepting the lot. The OC is specified:

$$L(p) = \left( \sum_{i=0}^c \binom{r}{i} p^i (1-p)^{r-i} \right)^g \quad (2.8)$$

The OC values for each sampling strategy can be found using equation 2.8. In order to reduce space, we display OC values for  $\frac{\mu}{\mu_0} = 2, 4, 6, 8, 10, 12$ ;  $\beta = 0.25, 0.10, 0.05, 0.01$ ;  $\delta = 0.7, 0.8, 1.0, 1.2, 1.5, 2.0$ ; are given in Table 2.

## 2.3. Producer's Risk

The manufacturer may be concerned in improving the product quality level such that the probability of acceptance is more than a specific level. Say  $\alpha$ , for some value of the risk of the producer, the minimal proportion could being achieved by meeting the next challenge:

$$\left( \sum_{i=0}^c \binom{r}{i} p^i (1-p)^{r-i} \right)^g \geq 1 - \alpha \quad (2.9)$$

To conserve space, the minimal ratio values  $\frac{\mu}{\mu_0} = 2$  for a new weighted exponential distribution on the basis of values disposed in Table 1, for accepting a lot at  $\alpha = 0.05$ , risk of the producer are presented in Table 3.

**Table 1:** Margin no. of testers( $r$ ) required for the plan suggested in NWED's case.

| $\beta$ | $g$ | $c$ | $\delta$ |     |     |     |     |     |
|---------|-----|-----|----------|-----|-----|-----|-----|-----|
|         |     |     | 0.7      | 0.8 | 1.0 | 1.2 | 1.5 | 2.0 |
| 0.25    | 4   | 0   | 2        | 2   | 1   | 1   | 1   | 1   |
|         | 4   | 1   | 4        | 3   | 3   | 3   | 2   | 2   |
|         | 4   | 2   | 6        | 5   | 4   | 4   | 4   | 3   |
|         | 5   | 3   | 7        | 7   | 6   | 5   | 5   | 4   |
|         | 6   | 4   | 9        | 8   | 7   | 7   | 6   | 5   |
|         | 7   | 5   | 11       | 10  | 9   | 8   | 7   | 7   |
|         | 8   | 6   | 13       | 12  | 10  | 9   | 8   | 8   |
|         | 9   | 7   | 15       | 14  | 12  | 11  | 10  | 9   |
|         | 10  | 8   | 17       | 15  | 13  | 12  | 11  | 10  |
| 0.10    | 2   | 0   | 3        | 3   | 2   | 2   | 2   | 1   |
|         | 3   | 1   | 5        | 4   | 4   | 3   | 3   | 2   |
|         | 4   | 2   | 7        | 6   | 5   | 5   | 4   | 4   |
|         | 5   | 3   | 8        | 8   | 7   | 6   | 5   | 5   |
|         | 6   | 4   | 10       | 9   | 8   | 7   | 7   | 6   |
|         | 7   | 5   | 12       | 11  | 10  | 9   | 8   | 7   |
|         | 8   | 6   | 14       | 13  | 11  | 10  | 9   | 8   |
|         | 9   | 7   | 16       | 15  | 13  | 12  | 10  | 9   |
|         | 10  | 8   | 18       | 17  | 14  | 13  | 12  | 10  |
| 0.05    | 2   | 0   | 4        | 3   | 3   | 2   | 2   | 2   |
|         | 3   | 1   | 5        | 5   | 4   | 4   | 3   | 3   |
|         | 4   | 2   | 7        | 7   | 6   | 5   | 4   | 4   |
|         | 5   | 3   | 9        | 8   | 7   | 6   | 6   | 5   |
|         | 6   | 4   | 11       | 10  | 9   | 8   | 7   | 6   |
|         | 7   | 5   | 13       | 12  | 10  | 9   | 8   | 7   |
|         | 8   | 6   | 15       | 14  | 12  | 11  | 9   | 8   |
|         | 9   | 7   | 17       | 16  | 13  | 12  | 11  | 9   |
|         | 10  | 8   | 19       | 17  | 15  | 13  | 12  | 11  |
| 0.01    | 2   | 0   | 5        | 5   | 4   | 3   | 3   | 2   |
|         | 3   | 1   | 7        | 6   | 5   | 5   | 4   | 3   |
|         | 4   | 2   | 9        | 8   | 7   | 6   | 5   | 4   |
|         | 5   | 3   | 11       | 10  | 8   | 7   | 6   | 5   |
|         | 6   | 4   | 13       | 11  | 10  | 9   | 8   | 7   |
|         | 7   | 5   | 15       | 13  | 11  | 10  | 9   | 8   |
|         | 8   | 6   | 17       | 15  | 13  | 12  | 10  | 9   |
|         | 9   | 7   | 19       | 17  | 15  | 13  | 11  | 10  |
|         | 10  | 8   | 21       | 19  | 16  | 14  | 13  | 11  |

**Table 2:** OC numbers of hybrid group acceptance sampling plan (HGASP) in NWED for  $g=4$  &  $c=2$ .

| $\beta$ | $r$ | $\delta$ | $\frac{\mu}{\mu_0}$ |        |        |        |        |        |
|---------|-----|----------|---------------------|--------|--------|--------|--------|--------|
|         |     |          | 2                   | 4      | 6      | 8      | 10     | 12     |
| 0.25    | 4   | 0.7      | 0.1275              | 0.0216 | 0.0070 | 0.0031 | 0.0016 | 0.0009 |
|         | 4   | 0.8      | 0.1733              | 0.0309 | 0.0102 | 0.0045 | 0.0024 | 0.0014 |
|         | 2   | 1.0      | 0.2786              | 0.0555 | 0.0189 | 0.0085 | 0.0045 | 0.0027 |
|         | 2   | 1.2      | 0.3930              | 0.0879 | 0.0309 | 0.0141 | 0.0076 | 0.0045 |
|         | 2   | 1.5      | 0.5598              | 0.1497 | 0.0555 | 0.0260 | 0.0141 | 0.0085 |
|         | 2   | 2.0      | 0.7765              | 0.2786 | 0.1135 | 0.0555 | 0.0309 | 0.0189 |
| 0.10    | 5   | 0.7      | 0.3968              | 0.0882 | 0.0309 | 0.0141 | 0.0076 | 0.0045 |
|         | 5   | 0.8      | 0.4954              | 0.1220 | 0.0441 | 0.0204 | 0.0110 | 0.0066 |
|         | 5   | 1.0      | 0.6709              | 0.2032 | 0.0781 | 0.0372 | 0.0204 | 0.0123 |
|         | 4   | 1.2      | 0.8024              | 0.2972 | 0.1220 | 0.0598 | 0.0333 | 0.0204 |
|         | 4   | 1.5      | 0.9192              | 0.4466 | 0.2032 | 0.1044 | 0.0598 | 0.0372 |
|         | 1   | 2.0      | 0.9860              | 0.6709 | 0.3634 | 0.2032 | 0.1220 | 0.0781 |
| 0.05    | 5   | 0.7      | 0.5379              | 0.1385 | 0.0507 | 0.0236 | 0.0128 | 0.0077 |
|         | 5   | 0.8      | 0.6437              | 0.1878 | 0.0713 | 0.0338 | 0.0185 | 0.0111 |
|         | 5   | 1.0      | 0.8066              | 0.3003 | 0.1234 | 0.0605 | 0.0338 | 0.0206 |
|         | 3   | 1.2      | 0.9053              | 0.4207 | 0.1878 | 0.0957 | 0.0545 | 0.0338 |
|         | 3   | 1.5      | 0.9722              | 0.5926 | 0.3003 | 0.1624 | 0.0957 | 0.0605 |
|         | 3   | 2.0      | 0.9973              | 0.8066 | 0.4998 | 0.3003 | 0.1878 | 0.1234 |
| 0.01    | 7   | 0.7      | 0.7643              | 0.2641 | 0.1058 | 0.0513 | 0.0284 | 0.0173 |
|         | 7   | 0.8      | 0.8496              | 0.3436 | 0.1453 | 0.0722 | 0.0406 | 0.0249 |
|         | 6   | 1.0      | 0.9460              | 0.5041 | 0.2386 | 0.1249 | 0.0722 | 0.0451 |
|         | 6   | 1.2      | 0.9831              | 0.6484 | 0.3436 | 0.1899 | 0.1132 | 0.0722 |
|         | 5   | 1.5      | 0.9975              | 0.8106 | 0.5041 | 0.3034 | 0.1899 | 0.1249 |
|         | 2   | 2.0      | 0.9999              | 0.9460 | 0.7291 | 0.5041 | 0.3436 | 0.2386 |

**Table 3:** For NWED, the minimum ratio of actual median values and indicated median at risk of the manufacturer  $\alpha = 0.05$

| $\beta$ | $g$ | $C$ | $\delta$ |         |         |         |         |         |
|---------|-----|-----|----------|---------|---------|---------|---------|---------|
|         |     |     | 0.7      | 0.8     | 1.0     | 1.2     | 1.5     | 2.0     |
| 0.25    | 2   | 0   | 6.7465   | 7.7103  | 9.6379  | 11.5654 | 14.4567 | 19.2755 |
|         | 3   | 1   | 2.3498   | 2.6855  | 3.3568  | 4.0281  | 5.0351  | 6.7135  |
|         | 4   | 2   | 1.4769   | 1.6879  | 2.1099  | 2.5317  | 3.1647  | 4.2195  |
|         | 5   | 3   | 1.1131   | 1.2721  | 1.5901  | 1.9082  | 2.3851  | 3.1801  |
|         | 6   | 4   | 1.0001   | 1.0441  | 1.3051  | 1.5661  | 1.9576  | 2.6100  |
|         | 7   | 5   | 1.0001   | 1.0002  | 1.1244  | 1.3493  | 1.6865  | 2.2486  |
|         | 8   | 6   | 1.0001   | 1.0002  | 1.0003  | 1.1988  | 1.4985  | 1.9980  |
|         | 9   | 7   | 1.0001   | 1.0002  | 1.0003  | 1.0880  | 1.3600  | 1.8132  |
|         | 10  | 8   | 1.0001   | 1.0002  | 1.0003  | 1.0027  | 1.2533  | 1.6710  |
| 0.10    | 2   | 0   | 18.4208  | 21.0523 | 26.3154 | 31.5784 | 39.4730 | 52.6307 |
|         | 3   | 1   | 4.1053   | 4.6917  | 5.8646  | 7.0375  | 8.7968  | 11.7291 |
|         | 4   | 2   | 2.2138   | 2.5301  | 3.1627  | 3.7951  | 4.7439  | 6.3252  |
|         | 5   | 3   | 1.5415   | 1.7616  | 2.2020  | 2.6424  | 3.3029  | 4.4039  |
|         | 6   | 4   | 1.2045   | 1.3767  | 1.7207  | 2.0648  | 2.5810  | 3.4413  |
|         | 7   | 5   | 1.0034   | 1.1467  | 1.4334  | 1.7200  | 2.1500  | 2.8666  |
|         | 8   | 6   | 1.0001   | 1.0002  | 1.2425  | 1.4911  | 1.8638  | 2.4851  |
|         | 9   | 7   | 1.0001   | 1.0002  | 1.1065  | 1.3279  | 1.6597  | 2.2129  |
|         | 10  | 8   | 1.0001   | 1.0002  | 1.0045  | 1.2053  | 1.5067  | 2.0089  |

|      |    |   |          |          |          |          |          |          |
|------|----|---|----------|----------|----------|----------|----------|----------|
| 0.05 | 2  | 0 | 37.8376  | 43.2429  | 54.0537  | 64.8643  | 81.0804  | 108.1073 |
|      | 3  | 1 | 6.0406   | 6.9035   | 8.6294   | 10.3552  | 12.9440  | 17.2586  |
|      | 4  | 2 | 2.9169   | 3.3337   | 4.1670   | 5.0004   | 6.2505   | 8.3339   |
|      | 5  | 3 | 1.9205   | 2.1948   | 2.7435   | 3.2921   | 4.1152   | 5.4868   |
|      | 6  | 4 | 1.4503   | 1.6575   | 2.0718   | 2.4862   | 3.1076   | 4.1435   |
|      | 7  | 5 | 1.1804   | 1.3491   | 1.6863   | 2.0234   | 2.5293   | 3.3724   |
|      | 8  | 6 | 1.0062   | 1.1498   | 1.4373   | 1.7247   | 2.1559   | 2.8745   |
|      | 9  | 7 | 1.0001   | 1.0109   | 1.2635   | 1.5162   | 1.8952   | 2.5269   |
|      | 10 | 8 | 1.0001   | 1.0002   | 1.1353   | 1.3624   | 1.7029   | 2.2705   |
| 0.01 | 2  | 0 | 193.1082 | 220.6950 | 275.8687 | 331.0425 | 413.8031 | 551.7374 |
|      | 3  | 1 | 14.1234  | 16.1410  | 20.1761  | 24.2112  | 30.2642  | 40.3519  |
|      | 4  | 2 | 5.2948   | 6.0512   | 7.5638   | 9.0766   | 11.3458  | 15.1275  |
|      | 5  | 3 | 3.0738   | 3.5129   | 4.3911   | 5.2693   | 6.5866   | 8.7820   |
|      | 6  | 4 | 2.1517   | 2.4592   | 3.0740   | 3.6887   | 4.6107   | 6.1477   |
|      | 7  | 5 | 1.6642   | 1.9019   | 2.3774   | 2.8529   | 3.5662   | 4.7547   |
|      | 8  | 6 | 1.3673   | 1.5625   | 1.9531   | 2.3437   | 2.9296   | 3.9061   |
|      | 9  | 7 | 1.1687   | 1.3358   | 1.6697   | 2.0035   | 2.5043   | 3.3389   |
|      | 10 | 8 | 1.0273   | 1.1741   | 1.4675   | 1.7610   | 2.2013   | 2.9349   |

### 3. Findings

#### 3.1. Tables and Examples

The HGASP project specifications are presented in Table 1, which illustrates the value of alternative consumers' risks and multiplier testing duration. Note that, the product  $n = r * g$  can acquire the requisite minimum sample size. From Table 1 observe that the testers' number  $r$  lowers while the test termination time  $\delta$  is increasing. That is, where the multiplier of test duration increases to a fixed group, fewer testers are needed. For the example in Table 1, when  $\beta = 0.25$ ,  $g = 7$ ,  $c = 5$  then  $\delta$  shifts from 0.7 to 0.8, this implies change in the HGASP parameter determined necessary value from  $r = 11$  to  $r = 10$ ; this pattern, however, is not consistent because the amount of acceptations also relies on. Table 2 shows the ratio corresponding to the manufacturer's risk. Lastly, Table 3 indicates the minimal ratio values of the original batch median to the stated median in the batch, where the manufacturer's risk with  $\alpha = 0.05$ .

For instance, assume that the termination date of any product follows a new weighted exponential distribution, and you want to develop HGASP to evaluate the median over 1,000 hours on the basis of 700 hours test time and use 4 groups. Suppose,  $c = 2$  and  $\beta = 0.10$ . The result is the final multiplier  $\delta = 0.700$ . According to Table 1, the minimum number of testers required is  $r = 7$ . Randomly sample  $n = 28$  elements, and assign 7 items for 700 hours of testing to each of the 4 groups. A total of 28 goods are therefore required and 7 positions are assigned to each of the 4 groups. If there are no more than 2 errors occurring before 700 hours in each of the 4 groups, we will accept one batch. Before the 700<sup>th</sup> hour, if the third error occurs, we will immediately stop the experiment. This sampling plan was proposed, when the true median ( $\mu$ ) is equal to 4000 hours, then the acceptance chance

( $p$ ) is 0.3968. This shows that, when actual median is four times the value needed  $\mu_0 = 1000$  hours, then the manufacturer's risk  $\alpha = 0.6032$ .

If the ratio is necessary to ensure the risk of a producer  $\alpha = 0.05$ , from Table 3 we can get it. For instance, consider  $\beta = 0.10$ ;  $r = 6$ ;  $g = 4$ ;  $c = 2$  &  $\delta = 0.700$ , then the appropriate proportion is

$$\frac{\mu}{\mu_0} = 2.2138.$$

#### 4. DISCUSSION AND CONCLUSION

This paper recommends a sampling plan for hybrid group acceptance for mixed groups based upon shortened lifespan, if data are considered following the new weighted exponential distribution, and if the potential risk of consumers'  $\beta$  is matched by additional plan parameters, the group number required and the number of receipts. As the test termination times grow, the minimum number of groups required reduces. In addition, the performance increases proportionally with the increase in quality. The HGASP might be utilised for a life trial if a multitude of products are adopted at a time and would be useful in time and money as a result of simultaneous testing a group of goods. Hence we conclude that the suggested hybrid group acceptance sampling plan is more economical in the sense of saving testing time, cost, energy and labour.

#### 5. REFERENCES

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