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A Study on Rate of Occurrence of failure using HPP for 225 kw windmill data

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Abstract: . In this article, windmill data is taken into consideration which describes ROCOF and failure model is assumed in HPP. For this data ,the result which is analyzed is obtained to be increasing , decreasing or a constant. In this article, Laplace test statistic is also discussed.

KEYWORDS-.Failure time data , HPP ,Reliability, ROCOF, repairable system, , Z-test statistics

I. INTRODUCTION

Reliability is one of the important characteristics of any test[2],[9]. The necessity for reliability is to know the truth, effective results, Statistical power and relationship of variables

Mechanical reliability is a huge historic subject matter wherein humans have constraints and processes to be able to be as reliable as possible[11]. Mechanical systems are designed in this kind of manner that they can avoid past failures..

Knowledge of Statistics and chance is crucial to study and create a dependable mechanical device.

It could be very complex to inform the reliability of mechanical components formulated for a certain machine

The segment of making ready the historic statistics to inform about the future reliability of mechanical additives is categorized by way of their failure.

It is confirmed that mechanical elements do now not live on indefinitely without upkeep.[8] A huge part of mechanical reliability is determining whilst maintenance have to be carried out as a way to prevent a failure.

II. METHODS AND FORMULATION

2.1 Laplace test statistics is defined as a estimation that relates the centroid of perceived arrival time with the midpoint during the period of observations.

The test statistics records may be carried out in grasping secular evolution of each day rainfall in a place. It is likewise positioned to use in LAD regression(Least absolute deviation)

In LAD regression ,Laplace test statistics is utilized by taking the coefficients in order and decrease the summation of absolute errors

2.2 Homogeneous Poisson Process

The constant Poisson action is the simplest point method, and it is the absent model in action to which spatial agency patterns are generally compared[1]. Its realizations are said to display complete spatial randomness (CSR).HPP model fits flat portion of "bathtub" curve

The only beneficial model for M(t) is M(t)=at and the repair rate (or ROCOF) is the constant m(t)=a. This model comes about while the interarrival times between failures are impartial and identically dispensed in keeping with the exponential distribution, with parameter a. This basic model is likewise referred to as a Homogeneous Poisson Process (HPP).

$F(t)=1-e^{-at}$= CDF of the waiting time to the next failure

N(T)= Cumulative number of failures from time 0 to time T

2.4 Z-Score is a result of standardizing an individual information point Simply placed Z-Score offers us an idea of ways far the information points is from mean measured in terms of S.D.

z=(x-m)/(s*)……(1)

Where x is the observed value a is the mean ,s is the standard deviation of the data[4].

2.5 Rate of occurrence of failure:

Rate of incidence of failure (ROCOF) is used to version the trend (constant increasing, decreasing) inside the failure inter arrival times[5]

For a repairable device, we want the ROCOF to be enhancing (failure interarrival time to be increasing)

2.5.1 Unrepairable

The unrepairable population manner that failed character gadgets might be completely eliminated from the populace[10]. Failure rate is hazard rate of a life-time distribution – a property of time to failure

2.5.2 Repairable

A repairable system is one which can be restored to nice operation with the aid of any motion, along with components replacements or modifications to adjustable settings..Failure rate is rate of occurrence of failures (ROCOF) – a property of a sequence of failure times[12].

III. DESCRIPTION

Here we considered the time and number of failure rate of 225 KW windmill data

225 kW System	
Time between Failure	No. of Failure
1440	1
2880	2
4320	1
6480	2
11520	2
12960	2
14400	2
15120	1
15840	3
16560	3
17280	1
18720	1
20880	3
21600	1
22320	1
23040	3
……..	……
……	……..
25920	2

27360	1
29520	4
30240	7
30960	6
31680	3
32400	1
33840	1
35280	1
36720	3
37440	2
39600	4
40320	2
41040	1
42480	7
43200	1

IV. RESULT AND DISCUSSION:

Table 4.1

RESULTS FROM ROCOF		
Laplace test results		**At 95%confidence level**
U=-1.215	z-crit = (-1.96,+1.96)	ROCOF is constant

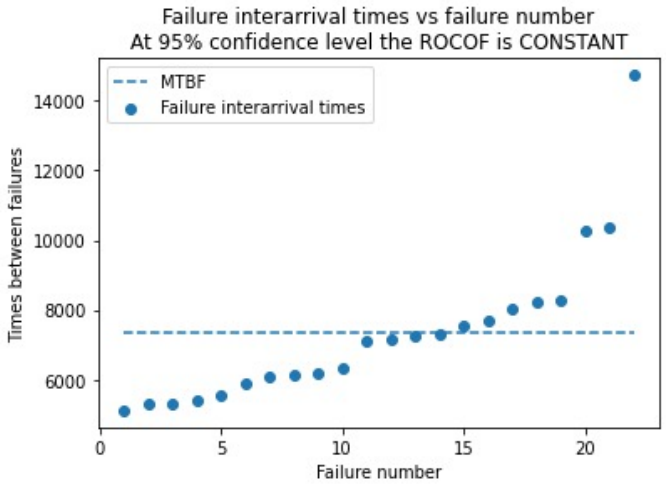

Figure 4.2

Table:4.1 shows ROCOF failure rate is very nearer to zero. ROCOF assuming HPP is 0.0001365 failures per unit time.

So this assumption in HPP method gives good result.

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