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THE ROLE OF LOGARITHMIC-NORMAL DISTRIBUTION MODELS IN ASSESSING THE RELIABILITY OF BEARING LIFE

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Abstract
In the article log-normal distribution model in engineering, especially bearings work the deadline in the evaluation importance seeing the model is main formulas, statistics indicators and practical results statement is being done.

Keywords: Log-normal distribution, bearing, reliability, mathematical model, statistical analysis.

Introduction

Modern technological in systems applicable reliability of components, especially bearings assessment technique of the field important from directions one is considered. Products from work exit period, performance duration and endurance level every always engineering solutions in improvement main indicator become service This will do. processes in modeling probability theory and statistic distribution model's role is incomparable.

In particular, the log -normal distribution is a real technical systems work duration in describing is an effective model. Because many practical in cases, for example, bearings obsolescence, electronic components work deadline or of materials eating speed such as in processes time according to variability logarithmic in a way happened will be. Such in cases exactly lognormal distribution from models use

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through statistic forecast and technician service show strategies determination possible.

This in the article Andijan state technique institute engineering in the direction of take going theoretical-practical research in the context of bearings work deadline according to log-normal distribution model based on reliability assessment issue is illuminated.

Logarithmic -normal distribution about general concept

If any continuous positive random quantity Xnatural logarithm of $Y = \ln(X)$ to the normal distribution has if, then X lognormal distribution has It is called. Such situations many real technicians and economic in processes Logarithmic- normal distribution has was Xdensity function of a random variable as follows is expressed as:

$$f(x) = \frac{1}{x\sigma\sqrt{2\pi}} e^{\left(-\frac{(\ln x-\mu)^2}{2\sigma^2}\right)}, \qquad x > 0.$$

Here:

$\mu - \ln(X)$ of mathematician unexpected, $\sigma - \ln(X)$) of standard deviation.

Mathematician unexpected and dispersion as follows is:

$$M(X) = e^{\mu+\frac{\sigma^2}{2}}, \quad D(X) = \left(e^{\sigma^2} - 1\right) \cdot e^{2\mu+\sigma^2}.$$

Practical Application: Logarithmic -normal distribution engineering, biology, economics, ecology and technique in the fields wide applies. Including:

Bearings, electronic lamps and other of elements from work exit time modeling; Crushed particles dimensions distribution; Economic indicators (income, deposits, work) (distribution of materials) eating and wear and tear analyses.

1. Issue: Bearings from work exit time to lognormal distribution obeys Condition. One kind of bearings for log -normal distribution according to following parameters defined:

$$\mu = 2.5, \qquad \sigma = 0.4.$$

Question:

1. This bearing mathematician expectation (average) work term) and Find the variance.
2. 1000 hours many work probability define.

Solution:

1. Mathematician unexpected and dispersion:

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$$M(T) = e^{\mu+\frac{\sigma^2}{2}} = e^{2.5+\frac{0.16}{2}} = e^{2.58} = 13.17\ soat,$$
$$D(t) = \left(e^{\sigma^2} - 1\right) \cdot e^{2\mu+\sigma^2} = (e^{0.16} - 1) \cdot e^{5+0.16} = (1.173 - 1) \cdot e^{5.16} = 30.18.$$

2. $\boldsymbol{P(T > 1000)}$ probability calculation:

- First $T = 1000$ Let's take the logarithm of:

$$\ln(1000) \approx 11.025.$$

Now Z −Let's go to the variable:

$$Z = \frac{6.91 - \mu}{\sigma} = \frac{6.91 - 2.58}{0.4} = 11.025.$$

Such high $\boldsymbol{Z}-$ in value perhaps $\approx \mathbf{0}$ That is, this bearing **1000** It is almost impossible to work the clock.

Conclusion. The studied model is as follows. shows that:

These bearings average work deadline 13.17 hour is, this short term is considered.1000 hour work probability and statistic in terms of to zero This analysis is equal to through working issuers products reliability evaluation, service periodicity to determine and backup parts in advance planning possible. The log - normal model application technician service in showing optimality provides, costs reduce and working release efficiency increases.

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