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## Systematic Routine for Setting Confidence Levels for Mean Time to Failure (MTTF)

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**Abstract:** There are circumstances where an item is intentionally tested to destruction. The purpose of this technique is to determine the failure rate ( $\lambda$ ) of a tested item. For these items, the quality attribute is defined as how long the item will last until failure. Once the failure rate is determined from the number of survivors and total time of all items tested the mean time to failure (MTTF) which is a typical statistic for survival data analysis issues. MTTF is calculated by dividing one by failure rate ( $\lambda$ ). From this one obtains the reliability function  $R(t) = e^{-\lambda t}$  where  $t$  is time. This allows the cumulative density function  $F(t) = 1 - e^{-\lambda t}$  to be determined. This density function,  $f(t) = \lambda e^{-\lambda t}$  is a negative exponential with a standard deviation ( $\sigma$ ) =  $1/\lambda$ . Thus setting a warranty policy for the tested item is difficult for the practitioner. An important property of the exponential distribution is that it is memory less. This means its conditional probability follows  $P(T > s + t | T > s) = P(T > t)$  for all  $s, t \geq 0$ . The exponential distribution can be used to describe the interval lengths between any two consecutive arrival times in a homogeneous Poisson process. The purpose of this research paper is to present a simple technique to determine a realistic confidence level. Using the same technique the warranty level for the tested item can be predicted.

*Keywords:* Mean Time to Failure, MTTF, negative exponential, standard deviation