# R Statistical Software Applied in Reliability Analysis: Case Study of Diesel Generator Fans

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**Abstract :** Reliability analysis represents a very important task in different areas of work. In any industry, this is crucial for maintenance, efficiency, safety and monetary costs. There are ways to calculate reliability, unreliability, failure density and failure rate. This paper will try to introduce another way of calculating reliability by using R statistical software. R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. The R programming environment is a widely used open source system for statistical analysis and statistical programming. It includes thousands of functions for the implementation of both standard and new statistical methods. R does not limit user only to operation related only to these functions. This program has many benefits over other similar programs: it is free and, as an open source, constantly updated; it has built-in help system; the R language is easy to extend with user-written functions. The significance of the work is calculation of time to failure or reliability in a new way, using statistic. Another advantage of this calculation is that there is no need for technical details and it can be implemented in any part for which we need to know time to fail in order to have appropriate maintenance, but also to maximize usage and minimize costs. In this case, calculations have been made on diesel generator fans but the same principle can be applied to any other part. The data for this paper came from a field engineering study of the time to failure of diesel generator fans. The ultimate goal was to decide whether or not to replace the working fans with a higher quality fan to prevent future failures. Seventy generators were studied. For each one, the number of hours of running time from its first being put into service until fan failure or until the end of the study (whichever came first) was recorded. Dataset consists of two variables: hours and status. Hours show the time of each fan working and status shows the event: 1- failed, 0- censored data. Censored data represent cases when we cannot track the specific case, so it could fail or success. Gaining the result by using R was easy and quick. The program will take into consideration censored data and include this into the results. This is not so easy in hand calculation. For the purpose of the paper results from R program have been compared to hand calculations in two different cases: censored data taken as a failure and censored data taken as a success. In all three cases, results are significantly different. If user decides to use the R for further calculations, it will give more precise results with work on censored data than the hand calculation.

**Keywords :** censored data, R statistical software, reliability analysis, time to failure
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