Reliability and Cost-benefit Analysis of a Single Unit System with Degradation and Inspection at Different Stages of Failure subject to Weather Conditions

Abstract

The main object of this paper is to develop a reliability model of a single-unit system operating under two weather conditions- normal and abnormal. There is a single server who visits the system immediately whenever needed and plays the dual role of inspection and repair. The unit does not work as new after repair at complete failure and so called the degraded unit. The unit is inspected at its partial failure to know the possibility of on-line repair as well as at its complete and degraded failure stages to reveal the feasibility of repair. Repair and inspection activities are stopped in abnormal weather while system remains operative. The rate of change of weather conditions and failure rates of the units are exponentially distributed whereas the inspection time and repair time distributions are taken as general. Various expressions for reliability and cost-benefit measures are derived using regenerative point technique. The numerical results for a particular case are also obtained to depict the behavior of mean time to system failure (MTSF), availability and profit of the system graphically.

References

- Nakagawa, T. , Osaki, S. 1976. Reliability analysis of a one-unit system with
unrepairable spare units and its optimization applications, Quarterly Operations Research, 27(1), 101-110.


Index Terms

Computer Science Applied Mathematics
Keywords
Single Unit System  Degradation  Inspection  Weather conditions and Cost-Benefit Analysis