
Contribution ID: **24** Type: **not specified**

# On the Number of Failed Components in a System and Its Application in Maintenance Models

In a failed system, the number of failed components at a particular time or at the time of system failure might be useful for understanding the stochastic behavior of the system. In this talk, we investigate the role of this quantity in scheduling optimal maintenance strategies for a multi-component system. The system has different types of independent components, and the components are assumed to be subject to both internal failures and fatal shocks. The system may fail due to the aging of its components, or it may fail due to fatal shocks arriving from external sources. We first study the probability of having a specific number of failed components of each type at the time of system failure. Then, under the above mechanism of system failure, we propose some optimal age-based and block preventive maintenance models. We provide some formulas for the average long-run cost rate of the proposed strategies. In addition, Monte Carlo simulations are carried out to evaluate the cost functions of the proposed maintenance models. Our derivations rely on the concept of survival signature.

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**Session Classification:** Withdrawn papers