

On weighted- k -out-of- n :G systems with multiple types of components

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Abstract

In this study a weighted k -out-of- n system composed of different types of components is considered. In this system, n components are divided into m ($2 < m < n$) groups based on their weight and reliability. The system only functions if the total weight of the operational components exceeds a certain threshold k . We study the reliability characteristics of the system under conditions where the components can be either independent or dependent. In addition, we address three optimization problems related to these systems. The first problem is to determine the optimal number of components for each group to achieve a required minimum reliability while minimizing the total acquisition cost. The second problem focuses on maximizing system reliability for a given total acquisition cost by optimizing the quantities of components for each group. Finally, the third problem is determining the system's optimal replacement time.

Key words. Weighted- k -out-of- n system, reliability, mean time to failure, replacement time

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