

COMPARISONS FOR MAINTENANCE POLICIES INVOLVING COMPLETE AND MINIMAL REPAIR

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Maintenance policies are compared under various types of aging. Formerly, a standard assumption was that when a component or system failed, it was replaced by a new one. Preventive maintenance usually took the form of replacement according to an age or block policy. Under the assumption that a component can be minimally repaired, new results involving block replacement policies can be obtained. An analog of age replacement, called repair replacement, is also discussed and compared with other policies.

1. Introduction. The study of operating characteristics of maintenance policies in reliability has a long history. For a survey of the very early developments see Barlow and Proschan (1965). In this article we shall review one aspect of this area, the comparison of maintenance policies.

A maintenance policy involves repairing or replacing a system or component when it fails. This cycle is continued indefinitely. We shall not consider the time taken to repair the component in this paper. An assumption equivalent to not considering these repair times, which we shall make, is that repairs or replacements are instantaneous. Rather than waiting for components to fail, intervention is possible in the sense that replacements may be planned. That is, working components can be replaced (or overhauled, but we shall consider only replacements for planned intervention in this paper) before failure. Two standard forms of intervention are block and age policies. A block policy is said to be in effect if components are replaced on a fixed schedule determined a priori and not depending on unplanned failures which may occur. Unplanned failures are handled as if there were no block policy. An age policy mandates replacement on a fixed schedule starting at time zero and continuing until an unplanned failure occurs at which time a new schedule starts.

If components are used which wear out it would seem that intervention of the age or block type would result in fewer unplanned failures. It has been shown

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