
Preface

Many serious accidents have happened in the world where systems have been large-scale and complex, and have caused heavy damage and a social sense of instability. Furthermore, advanced nations have almost finished public infrastructure and rushed into a maintenance period. Maintenance will be more important than production, manufacture, and construction, that is, *more maintenance* for environmental considerations and for the protection of natural resources. From now on, the importance of maintenance will increase more and more. In the past four decades, valuable contributions to maintenance policies in reliability theory have been made. This book is intended to summarize the research results studied mainly by the author in the past three decades.

The book deals primarily with standard to advanced problems of maintenance policies for system reliability models. System reliability can be mainly improved by repair and preventive maintenance, and replacement, and reliability properties can be investigated by using stochastic process techniques. The optimum maintenance policies for systems that minimize or maximize appropriate objective functions under suitable conditions are discussed both analytically and practically.

The book is composed of nine chapters. Chapter 1 is devoted to an introduction to reliability theory, and briefly reviews stochastic processes needed for reliability and maintenance theory. Chapter 2 summarizes the results of repair maintenance, which is the most basic maintenance in reliability. The repair maintenance of systems such as the one-unit system and multiple-unit redundant systems is treated. Chapters 3 through 5 summarize the results of three typical maintenance policies of age, periodic, and block replacements. Optimum policies of three replacements are discussed, and their several modified and extended models are proposed. Chapter 6 is devoted to optimum preventive maintenance policies for one-unit and two-unit systems, and the useful modified preventive policy is also proposed. Chapter 7 summarizes the results of imperfect maintenance models. Chapter 8 is devoted to optimum inspection policies. Several variant inspection models with approximate inspection

policies, inspection policies for a standby unit, a storage system and intermittent faults, and finite inspection models are proposed. Chapter 9 presents five maintenance models such as discrete replacement and inspection models, finite replacement models, random maintenance models, and replacement models with spares at continuous and discrete times.

This book gives a detailed introduction to maintenance policies and provides the current status and further studies of these fields, emphasizing mathematical formulation and optimization techniques. It will be helpful for reliability engineers and managers engaged in maintenance work. Furthermore, sufficient references leading to further studies are cited at the end of each chapter. This book will serve as a textbook and reference book for graduate students and researchers in reliability and maintenance.

I wish to thank Professor Shunji Osaki, Professor Kazumi Yasui and all members of the Nagoya Computer and Reliability Research Group for their cooperation and valuable discussions. I wish to express my special thanks to Professor Fumio Ohi and Dr. Bibhas Chandra Giri for their careful reviews of this book, and Dr. Satoshi Mizutani for his support in writing this book. Finally, I would like to express my sincere appreciation to Professor Hoang Pham, Rutgers University, and editor Anthony Doyle, Springer-Verlag, London, for providing the opportunity for me to write this book.

Toyota, Japan

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June 2005



<http://www.springer.com/978-1-85233-939-5>

Maintenance Theory of Reliability

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2005, X, 270 p., Hardcover

ISBN: 978-1-85233-939-5