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BOOK REVIEW

Reliability Engineering

Theory and Practice

Eight Edition

Prof. Dr. Alessandro Birolini

Springer-Verlag GmbH

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Reviewer: Kenneth P. LaSala, Ph.D., KPL Systems, past president, IEEE Reliability Society

Recently, Professor, Dr. Alesandro Birolini published the eighth edition of his excellent text entitled ***Reliability Engineering, Theory and Practice***. For those of you who are familiar with his previous editions, you will find it to be an expansion of previous editions that is worthwhile acquiring. Those who are not familiar with previous editions will find this edition, like the earlier ones, to be an outstanding reference and instructional text on the theory and practice of the reliability discipline and closely related disciplines.

This book shows how to build in and assess reliability, availability, maintainability, and safety (RAMS) into components, equipment, and systems. It presents the state of the art of RAMS with respect to both theory and practice of the discipline. The book structure allows rapid access to practical results. The book presents methods and tools in a manner that allows their being tailored to specific applications. There are appendices that make the book mathematically self-contained. The extensive text is augmented with 60 tables, 210 figures, 140 examples, and 80 homework problems. There is a chapter-oriented list of references and a comprehensive index to facilitate use of the book. Approximately 40% of the 650 pages are devoted to the eleven appendices, many of which are small tutorial texts in themselves. Among the topics described by the appendices are basic probability theory, basic stochastic processes theory, basic mathematical statistics, and tables and charts.

The Preface to the 8th Edition states that this final edition extends and replaces all previous editions and details the many enhancements that are made in the eighth addition, too many for recounting in this review. That said, this reviewer will summarize only a few of those enhancements. New to the book are an introduction to risk management with structurally new models based on semi-Markov processes. Also new is the inclusion of the mean-time-to-accident concept, discussion of the reliability and availability of a k-out-of-n redundancy with arbitrary repair rate for n-k=2, ten new homework

- Review, Book by Trivedi & Bobbio

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problems, and refinements on multiple failure rate mechanisms, approximate expressions for large complex systems, and data analysis.

The book is very comprehensive in it span of subjects. Two inclusions that this reviewer likes particularly are reliability allocation, Section 2.4, and Human reliability, Section 6.10. Both subjects are not treated well in other texts, but the author provides a reasonable amount of coverage for them in this edition. For allocation, the author briefly describes several approaches to allocating reliability and includes an optimization approach that includes the consideration of cost. For the often considered mysterious subject of human reliability, the author provides a very brief overview of available analysis methods and then introduces three structurally new basic models that combine human error probability and time necessary to accomplish a task. Section 5.2.5 includes a few design guidelines for reducing human error.

As in the cases of the previous editions, the book is extremely well-written. This reviewer recommends the book strongly both as a desk-top reference and an instructional text.