Accelerated Testing Statistical Models Test Plans And Data Analysis

NICHOLSON MCNEIL

SAE International
In today's global and highly competitive environment, continuous improvement in the processes and products of any field of engineering is essential for survival. This book gathers together the full range of statistical techniques required by engineers from all fields. It will assist them to gain sensible statistical feedback on how their processes or products are functioning and to give them realistic predictions of how these could be improved. The handbook will be essential reading for all engineers and engineering-connected managers who are serious about keeping their methods and products at the cutting edge of quality and competitiveness.
Encyclopedia of Statistical Sciences, Volume 1 CRC Press
This compact and easy-to-understand text presents the underlying principles and practice of reliability engineering and life testing. It describes the various techniques available for reliability analysis and prediction and explains the statistical methods necessary for reliability modelling, analysis and estimation. The text also discusses in detail the concepts of life testing, its classification and methodologies as well as accelerated life tests, the methodologies and models of stress related failure rates evaluation, and data analysis. Besides, it elaborates on the principles, methods and equipment of highly accelerated life testing and highly accelerated stress screening. Finally, the book concludes with a discussion on the parametric as well as non-parametric methods generally used for reliability estimation, and the recent developments in life testing of engineering components. Key Features The book is up-to-date and very much relevant to the present industrial, research, design, and development scenarios. Provides adequate tools to predict the system reliability at the design stage, to plan and conduct life testing on the products at various stages of development, and to use the life test and field data to estimate the product reliability. Gives sufficiently large number of worked-out examples. Primarily intended as a textbook for the postgraduate students of engineering (M.Tech., Reliability Engineering), the book would also be quite useful for reliability practitioners, professional engineers, and researchers.
Safety, Reliability and Risk Analysis John Wiley & Sons
The authors of this monograph have developed a large and important class of survival analysis models that generalize most of the existing models. In a unified, systematic presentation, this monograph fully details those models and explores areas of accelerated life testing usually only touched upon in the literature. Accelerated Life Models:
Applied Life Data Analysis Springer Science & Business Media
Enrique Castillo is a leading figure in several mathematical and engineering fields. Organized to honor Castillo's significant contributions, this volume is an outgrowth of the "International Conference on Mathematical and Statistical Modeling," and covers recent advances in the field. Applications to safety, reliability and life-testing, financial modeling, quality control, general inference, as well as neural networks and computational techniques are presented.
Accelerated Testing and Validation Springer Science & Business Media
Early approaches to accelerated testing were based on the assumption that there was a simple acceleration factor that would correspond to a linear scaling of time from the operating stress to the accelerating stress. This corresponds to the simplest physical model of the kinetics governing the underlying degradation, but this simple model does not

Accelerated Testing World Scientific
This volume is a collection of invited chapters covering recent advances in accelerated life testing and degradation models. The book covers a wide range of applications to areas such as reliability, quality control, the health sciences, economics and finance. It is an excellent reference for researchers and practitioners in applied probability and statistics, industrial statistics, the health sciences, quality control, economics, and finance.
Recent Advances in Life-Testing and Reliability Springer Science & Business Media
Probabilistic models; Basic statistical inference; The exponential distribution; The weibull distribution; The gamma distribution; Extreme-value distribution; The logistic and other distribution; Goodness-of-fit tests.
Zuverlässigkeitsanalyse und Qualitätssicherung Springer Science & Business Media
This unique volume presents chapters written on the areas of life-testing and reliability by many well-known researchers who have contributed significantly to these two areas over the years. Chapters cover a wide range of topics such as inference under censoring and truncation, reliability growth models, designs to improve quality, prediction techniques, Bayesian analysis of reliability, multivariate methods, accelerated testing, and more. The book is written in an easy-to-follow style, first presenting the necessary theoretical details and then illustrating the methods with a numerical examples wherever possible. Many tables and graphs that are essential for the use of some of the new methodologies are presented throughout the volume. Numerous examples provide the reader with a clear understanding of the methods presented as well as with insight into the applications of these results.
Statistical Modelling SAE International
http://www.worldscientific.com/worldscibooks/10.1142/4633
Parametric and Semiparametric Models with Applications to Reliability, Survival Analysis, and Quality of Life John Wiley & Sons
Safety, Reliability and Risk Analysis. Theory, Methods and Applications contains the papers presented at the joint ESREL (European Safety and Reliability) and SRA-Europe (Society for Risk Analysis Europe) Conference (Valencia, Spain, 22-25 September 2008). The book covers a wide range of topics, including: Accident and Incident Investigation; Crisi
Accelerated Testing Springer-Verlag
Accelerated Testing and Validation Methods is a cross-disciplinary guide that describes testing and validation tools and techniques throughout the product development process. Alex Porter not only focuses on what information is needed but also on what tools can produce the information in a timely manner. From the information provided, engineers and managers can determine what data is needed from a test and validation program and then how to select the best, most effective methods for obtaining the data. This book integrates testing and validation methods with a business perspective so readers can understand when, where, and how such methods can be economically justified. Testing and validation is about generating key information at the correct time so that sound business and engineering decisions can be made. Rather than simply describing various testing and validation techniques, the author offers readers guidance on how to select the best tools for a particular need, explains the appropriateness of different techniques to various situations and shows how to deploy them to ensure the desired information is accurately gathered. Emphasizes developing a strategy for testing and validation Teaches how to design a testing and validation program that deliver information in a timely and cost-effective manner
Qualität und Zuverlässigkeit technischer Systeme John Wiley & Sons
Proven statistical reliability analysis methods-available for the first time to engineers in the West While probabilistic methods of system reliability analysis have reached an unparalleled degree of refinement, Russian engineers have concentrated on developing more advanced statistical methods. Over the past several decades, their efforts have yielded highly evolved statistical models that have proven to be especially valuable in the estimation of reliability based upon tests of individual units of systems. Now Statistical Reliability Engineering affords engineers a unique opportunity to learn both the theory behind and applications of those statistical methods. Written by three leading innovators in the field, Statistical Reliability Engineering: * Covers all mathematical models for statistical reliability analysis, including Bayesian estimation, accelerated testing, and Monte Carlo simulation * Focuses on the estimation of various measures of system reliability based on the testing of individual units * Contains new theoretical results available for the first time in print * Features numerous examples demonstrating practical applications of the theory presented Statistical Reliability Engineering is an important professional resource for reliability and design engineers, especially those in the telecommunications and electronics industries. It is also an excellent course text for advanced courses in reliability engineering.
System Reliability Toolkit PHI Learning Pvt. Ltd.
Aus den Besprechungen: "...Mit der wachsenden Komplexität von Geräten und Anlagen sind im Laufe der Jahre die Aspekte von Zuverlässigkeit und Verfügbarkeit immer mehr in den Vordergrund gerückt. Das vorliegende Buch beschreibt den Stand der Technik auf dem Gebiet der Qualitäts- und Zuverlässigkeitssicherung von Geräten und Anlagen. Es richtet sich in erster Linie an Entwicklungsingenieure sowie an Qualitäts- und Zuverlässigkeitsfachleute. Behandelt werden Zuverlässigkeitsanalysen in der Entwicklungsphase, Wahl und Qualifikation elektronischer Bauteile, Instandhaltbarkeitsanalysen in der Entwicklungsphase, Qualitätssicherung der Software, Zuverlässigkeit und Verfügbarkeit reparierbarer Betrachtungseinheiten, statistische Zuverlässigkeitsprüfungen sowie Hebung der Qualität und der Zuverlässigkeit in der Fertigungsphase." Qualität und Zuverlässigkeit#1
Statistik für Ausfalldaten CRC Press
Provides authoritative guidance on statistical analysis techniques and inferential methods for one-shot device life-testing Estimating the reliability of one-shot devices—electro-expolsive devices, fire extinguishers, automobile airbags, and other units that perform their function only once—poses unique analytical challenges to conventional approaches. Due to how one-shot devices are censored, their precise failure times cannot be obtained from testing. The condition of a one-shot device can only be recorded at a specific inspection time, resulting in a lack of lifetime data collected in life-tests. Accelerated Life Testing of One-shot Devices: Data Collection and Analysis addresses the fundamental issues of statistical modeling based on data collected from accelerated life-tests of one-shot devices. The authors provide inferential methods and procedures for planning accelerated life-tests, and describe advanced statistical techniques to help reliability practitioners overcome estimation problems in the real world. Topics covered include likelihood inference, competing-risks models, one-shot devices with dependent components, model selection, and more. Enabling readers to apply the techniques to their own lifetime data and arrive at the most accurate inference possible, this practical resource: Provides expert guidance on comprehensive data analysis of one-shot devices under accelerated life-tests Discusses how to design experiments for data collection from efficient accelerated life-tests while conforming to budget constraints Helps readers develops optimal designs for constant-stress and step-stress accelerated life-tests, mainstream life-tests commonly used in reliability practice Includes R code in each chapter for readers to use in their own analyses of one-shot device testing data Features numerous case studies and practical examples throughout Highlights important issues, problems, and future research directions in reliability theory and practice Accelerated Life Testing of One-shot Devices: Data Collection and Analysis is essential reading for graduate students, researchers, and engineers working on accelerated life testing data analysis.
Stochastic Models in Reliability Engineering World Scientific
Inhaltsangabe:Einleitung: Elektronische Geräte sind in unserem Leben allgegenwärtig. Dass diese Systeme eine Erleichterung darstellen, fällt besonders dann auf, wenn sie nicht mehr funktionieren. Meist ist solch ein Ausfall aber nicht dem gesamten Gerät zuzuschreiben, sondern er beschränkt sich auf ein Element, welches seine Funktion nicht mehr erfüllt; sei es ein durchgeschlagener Kondensator oder eine Bus-Verbindung, die keine elektrische Leitfähigkeit mehr besitzt. Die Ursachen für solche Ausfälle sind vielseitig: Mangelnde Qualitätskontrollen bei der Fertigung, Fehlbedienung durch den Benutzer, Überbelastung, hohe Luftfeuchte oder mechanische Belastung können die Lebensdauer einer Komponente beeinflussen. Die vorliegende Arbeit befasst sich mit der Zuverlässigkeitsvorhersage elektronischer Komponenten. Es sollen Verfahren vorgestellt werden, die beanspruchen, eine Vielzahl von möglichen Umweltbedingungen und deren Einfluss auf die Komponenten- und Systemzuverlässigkeit zu quantifizieren. Besondere Aufmerksamkeit gilt der Berücksichtigung mechanischer Belastungen, die z.B. beim Start einer Rakete auftreten. Als wichtige Grundlage gehen Zuverlässigkeitsvorhersagen in die in Kapitel 2 beschriebenen technischen Risikoanalysen ein, die Gefährdungen und Risiken minimieren sollen. Hier dienen Ausfallwahrscheinlichkeiten zur Quantifizierung der Sicherheit und Zuverlässigkeit von Hardware. Die mathematische Definition der in Kapitel 2 erwähnten Ausfallwahrscheinlichkeit und der Ausfallrate wird neben anderen, für das Verständnis notwendigen Grundlagen, in Kapitel 3 erläutert. Dazu werden für die Beschreibung der Ausfallrate typische Verteilungen aufgezeigt. In Kapitel 4 wird die Exponentialverteilung, eine in Kapitel 3 vorgestellte Verteilung, als vereinfachende Modellannahme eingeführt. Sie wird von allen Standards zur Beschreibung der Ausfallrate angenommen. Zudem soll geklärt werden, wie die Ausfallrate und diverse Einflussfaktoren aus einer Sammlung von Feld- oder Testdaten gewonnen werden können. Die in Kapitel 3 und Kapitel 4 beschriebenen Grundlagen sind nötig, um die in Kapitel 5 beschriebenen klassischen Standards deuten und interpretieren zu können. Hier sollen multiplikative Standards wie MIL-HDBK-217, SAE (PREL), Telcordia (SR-332), CNET (RDF2000), BT (HRD5) und Italtel (IRPH) vorgestellt und deren Aufbau detailliert dargelegt werden. Insbesondere wird beschrieben, wie mechanische Belastung in multiplikativen Standards und diskreten [...]
Qualitätssicherung bei zensierten Daten CRC Press
The application of accelerated testing theory is a difficult proposition, yet one that can result in considerable time and cost savings, as well as increasing a product's useful life. In Accelerated Testing: A Practitioner's Guide to Accelerated and Reliability Testing, readers are exposed to the latest, most practical knowledge available in this dynamic and important discipline. Authors Bryan Dodson and Harry Schwab draw on their considerable experience in the field to present comprehensive, insightful views in this book. Development and quality assurance tests are defined in detail and are presented from a practical viewpoint. Included are testing fundamentals, plans and models, and equipment and methods most commonly used in accelerated testing. Individuals seeking to evaluate and improve the design lives of components and systems will find this book a valuable reference, with special attention being paid to testing in the mobility industries.
Burn-in Testing CRC Press
An effective reliability programme is an essential component of every product's design, testing and efficient production. From the failure analysis of a microelectronic device to software fault tolerance and from the accelerated life testing of mechanical components to hardware verification, a common underlying philosophy of reliability applies. Defining both fundamental and applied work across the entire systems reliability arena, this state-of-the-art reference presents methodologies for quality, maintainability and dependability. Featuring: Contributions from 60 leading reliability experts in academia and industry giving comprehensive and authoritative coverage. A distinguished international Editorial Board ensuring clarity and precision throughout. Extensive references to the theoretical foundations, recent research and future directions described in each chapter. Comprehensive subject index providing maximum utility to the reader. Applications and examples across all branches of engineering including IT, power, automotive and aerospace sectors. The handbook's cross-disciplinary scope will ensure that it serves as an indispensable tool for researchers in industrial, electrical, electronics, computer, civil, mechanical and systems engineering. It will also aid professional engineers to find creative reliability solutions and management to evaluate systems reliability and to improve processes. For student research projects it will be the ideal starting point whether addressing basic questions in communications and electronics or learning advanced applications in micro-electro-mechanical systems (MEMS), manufacturing and high-assurance engineering systems.
Springer Handbook of Engineering Statistics RIAC
in Massen gefertigte Produkte können unmöglich einzeln auf ihre Qualität hin getestet werden. Um Aussagen über Zuverlässigkeit der Produktionsabläufe oder Qualität der Produkte zu treffen, bedarf es statistischer Methoden, die den Schluss von einer Stichprobe auf die gesamte Produktion erlauben. Mathematische Methoden der Zuverlässigkeitsanalyse und Qualitätssicherung kommen nicht nur in der industriellen Praxis, sondern auch in Forschung und Entwicklung zum Einsatz. Ein Schwerpunkt des Buches liegt in der exakten Darstellung der mathematischen Grundlagen. Aus den Formeln werden Methoden für die direkte Anwendung entwickelt. Die große Anzahl an Beispielen wird von den Eingabeparametern bis zu den Ergebnissen nachvollziehbar präsentiert und viele können als Vorlage für eine unmittelbare Umsetzung in die Praxis dienen.
Statistical Models and Methods for Lifetime Data John Wiley & Sons
Parametric and semiparametric models are tools with a wide range of applications to reliability, survival analysis, and quality of life. This self-contained volume examines these tools in survey articles written by experts currently working on the development and evaluation of models and methods. While a number of chapters deal with general theory, several explore more specific connections and recent results in "real-world" reliability theory, survival analysis, and related fields. Specific topics covered include: * cancer prognosis using survival forests * short-term health problems related to air pollution: analysis using semiparametric generalized additive models * semiparametric models in the studies of aging and longevity This book will be of use as a reference text for general statisticians, theoreticians, graduate students, reliability engineers, health researchers, and biostatisticians working in applied probability and statistics.

Statistical Reliability Engineering John Wiley & Sons
The Wiley-Interscience Paperback Series consists of selected books that have been made more accessible to consumers in an effort to increase global appeal and general circulation. With these new unabridged softcover volumes, Wiley hopes to extend the lives of these works by making them available to future generations of statisticians, mathematicians, and scientists. ". . . a goldmine of knowledge on accelerated life testing principles and practices . . . one of the very few capable of advancing the science of reliability. It definitely belongs in every bookshelf on engineering." –Dev G. Raheja, Quality and Reliability Engineering International ". . . an impressive book. The width and number of topics covered, the practical data sets included, the obvious knowledge and understanding of the author and the extent of published materials reviewed combine to ensure that this will be a book used frequently." –Journal of the Royal Statistical Society

A benchmark text in the field, Accelerated Testing: Statistical Models, Test Plans, and Data Analysis offers engineers, scientists, and statisticians a reliable resource on the effective use of accelerated life testing to measure and improve product reliability. From simple data plots to advanced computer programs, the text features a wealth of practical applications and a clear, readable style that makes even complicated physical and statistical concepts uniquely accessible. A detailed index adds to its value as a reference source.