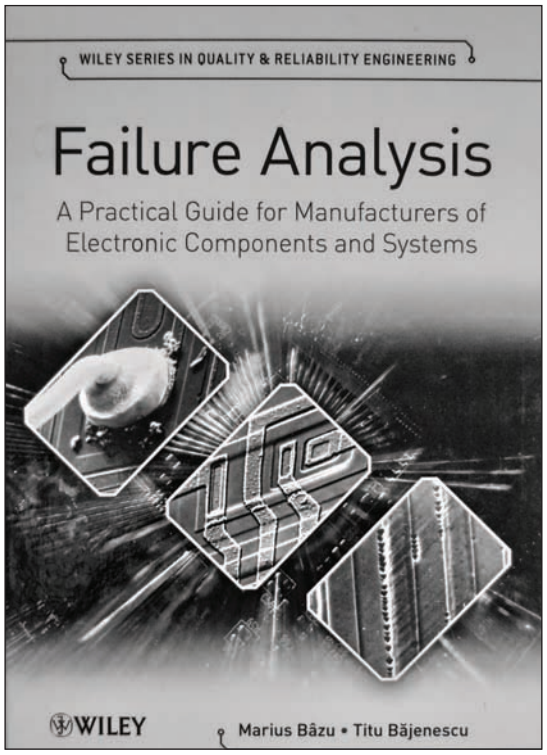

BOOKS REVIEWS

Marius Bâzu and **Titu Băjenescu**
Failure Analysis. A Practical Guide for Manufacturers of Electronic Components and Systems, John Wiley & Sons, Ltd 2011, ISBN 978-0-470-74824-4, 317 pages, $104.98.

This book re-launches the *Wiley Series in Quality and Reliability Engineering*; the main objective of these series is to provide a solid educational foundation for both practitioners and researchers in quality and reliability and to expand the readers' knowledge base to include the latest developments in this field.

The first goal of the book *Failure Analysis. A Practical Guide for Manufacturers of Electronic Components and Systems* is to present the basics of *failure analysis* (FA), considered the key action for solving reliability issues. But there is a second purpose, equally important: to promote the idea of reliability, to show the importance of this discipline in our days and the necessity to support the goals of reliability, as a discipline, in achieving a given level of reliability, as a key characteristic of any product. Even more important, this book is aimed to show to industry managers the reasons for taking into account the reliability issues even from the design phase and then during the whole cycle of development of any product. It was proved that the only way to promote reliability requirements is top-down, starting from the manager and going down to every worker. The third goal starts from the authors' subjective approach about reliability. They think reliability is a beautiful domain, offering immense satisfaction to any specialist, and involving a large range of knowledge, starting from physics, chemistry and mathematics and continuing with all engineering disciplines. That is why strong interdisciplinary teams are needed for solving reliability issues, which are difficult challenges for the human mind. The authors want to show to the young readers the beauty of the reliability analysis, which could be compared with a nice mathematical demonstration. Another approach is to consider a reliability analysis very similar to the activity of a detective: we have a 'dead component' and, based on the information gathered from those involved, we have to find out why this happened and 'who did it'. This is possible, because failures follow the law of cause and effect

This book is divided into six main parts. The first section (10% of the text) offers an introduction to the subject of FA, describing the history as well as the new challenges in reliability testing, such as its use in microsystems and nanostructures.

The second part discusses why failure analysis should be used with electronic components. Eight main reasons why FA is an important tool for improving yield and reliability by corrective actions are presented. It explains a synergetic approach, emphasizing the cooperation needed between a whole team involved in developing a new product.

The third section explains the appropriate moments for implementing FA. It starts at design stage, highlighting the 'concurrent engineering' approach and DfR (Design for Reliability).

Methods on how to use FA can be found in the fourth part of the book. The importance of this section can be seen in the large variety of methods described. Among others, the following are covered: electrical methods, thermal methods, optical methods, electron microscopy, mechanical methods, X-Ray methods, spectroscopic, acoustical, and laser methods. The results obtained by using such methods are also presented.

The largest part of the book is the fifth one, where failure modes and mechanisms are looked at in detail for the main technologies used for fabricating electronic components, along with reliability physics and the FA of materials.

Twelve complex case studies covering the main technologies and various FA methods are given an entire chapter in part six of the book, which concludes with a round-up of the benefits of FA.

A strong point which recommend this book are the authors: Dr. *Marius Bazu* and Prof. *Titu Bajenescu*, two well known specialists in the field, with a long experience in the domain of electronic components reliability and failure analysis, are indeed the right people to write this book.

Failure Analysis. A Practical Guide for Manufacturers of Electronic Components and Systems is an essential reference book that will prove of great importance for manufacturers and engineers involved in the design, fabrication and testing of electronic components, devices, and electronic systems, as well as for users of components in complex systems wanting to discover the roots of the reliability flaws for their products.

Consequently, I highly recommend this book, which is among the best ones in its category.

Prof. **Ioan C. BACIVAROV**, PhD
EUROQUALROM – University "Politehnica" of Bucharest
Editor-in-Chief "*Quality Assurance*"
Editor for Europe "*Quality Engineering*" (U.S.A.)