BOOK REVIEWS

Biological Performance of Materials: Fundamentals of Biocompatibility, Second Edition

Reviewed by Kenneth St. John, University of Mississippi Medical Center, Jackson, MI 39216.

REFERENCE: Black, J., *Biological Performance of Materials: Fundamentals of Biocompatibility (Second Edition)*, Marcel Dekker, Inc., New York, 1992, ISBN: 0-8247-8439-1, 400 pages, $99.75 (classroom discount available).

The performance of materials in the physiological environment when used in the construction of medical implants is a subject that has received a great deal of attention in the last several years, partially as a result of the highly publicized problems in the areas of cosmetic and reconstructive surgery and maxillofacial surgery which have been widely attributed to compatibility problems with specific silicone-based polymers and fluorocarbon polymers (respectively). The author of this book, a widely respected leader in the area of the investigation of the performance of implant materials, has revised and extensively updated the first edition to recognize the changes that had occurred since its publication.

While the author states that the book was initially intended as an undergraduate text, it will be equally useful to anyone who is seeking a good overview of the issues inherent in a discussion of the material performance issues for implantable medical devices. The sections are arranged in a logical order building from basic concepts, to deleterious effects of the physiological environment on the materials, possible mechanisms for adverse effects on the host (patient), to testing methodologies and standardization, and ending with an overview of the regulatory status of the qualification of materials for implant use and a suggested methodology for design and selection of materials.

Interspersed between the sections are two "Interparts" which are interjections of important material property and clinical performance information which add to the progress of the subject development and contribute to the overall understanding of the issues being raised. By their incorporation within the text as they become important, rather than being relegated to an appendix, they provide a perspective on the problem at an appropriate moment and do not require shifting to the back of the book for the information.

While each chapter builds on the previous ones, the book will also serve the researcher or implant design engineer as a valuable reference. The index is extensive and provides good assistance in directing the reader to the appropriate chapters. When the discussion is using information introduced earlier (or later) in the book, specific section references are given. At the end of each chapter, there is a list of the specific books and articles referenced in the text as well as a bibliography of other appropriate readings on the topic.

Overall, this book will be a valuable addition to the library of anyone concerned with the application of materials in implant applications. The information that it presents about the processes which can occur after a material is placed into the body are essential to anyone who is involved in the selection of implant materials. When used as a first text in "biocompatibility," it is a good introduction for those who may not have been exposed to these issues before. When used as a reference, it can act as a valuable road map to the items to be considered and the necessary sources of information for further investigation. Those concerned with the qualification of materials for use would do well to read and consider the author's comments on the status of current testing protocols and the current state of information about the clinical performance of the materials commonly accepted as being safe for use.

BOOK REVIEWS

Design and Analysis of Single-Ply Roof Systems

Reviewed by Justin Henshell, AIA, Henshell & Buccellato, Consulting Architects, Red Bank, NJ 07701.

REFERENCE: Phalen, T. E. Jr., *Design and Analysis of Single-Ply Roof Systems*, P T R Prentice Hall, Englewood Cliffs, NJ, 1993. ISBN: 0-13-203407-7, 734 pages.

Not since C. W. Griffin published his seminal book on built-up roofing [*1*] has anyone attempted to reduce the art of roofing to a science. Mr. Phalen endeavors to do the same for single-ply roofing.

Professor Phalen's 734-page textbook is an exhaustive treatise on single-ply systems. It discusses each type of single ply installation—ballasted, mechanically attached, and fully adhered—in great detail.

Each chapter begins with an introduction discussing the subject to be covered and concludes with a summary of the salient points of the material that was discussed. Between the introduction and summary is an engineering analysis of the subject matter replete with a plethora of graphs and formulae on virtually every page. There are also case histories, examples, and photographs of tests and failures. The arrangement is very useful for readers who wish to understand the engineering principles espoused in the book, but who are not using it as a design tool. The convenient location of the bibliography at the end of each chapter allows the reader to check references without turning to the end of the book.

The first two chapters provide criteria for comparing single-ply roof systems with conventional built-up roofing systems and discuss properties and design criteria for single-ply roof systems. The last chapter is an excellent study of heat flow and thermal resistance of single-ply roofing systems. It brings out the fundamental understanding of how the various components peculiar to single-ply systems respond to temperature differentials. This has been lacking in other treatises.

However, the title of the book is more encompassing than the contents. Nine chapters, or 70% of the book, are devoted to designing for wind uplift. This is not surprising since Mr. Phalen, a professor of engineering at Northeastern University, has spent many years investigating wind effects on single-ply roof systems. He has also served as a consultant to a major roof paver manufacturer.

The author presents the formulae and rationale to design a single-ply roof system based on sound engineering principles. This is a refreshing change from the pragmatic standards established by the single ply manufacturers' and model codes.

This will be a useful book for designers of single-ply systems on high-rise buildings in extremely windy locations. It will also be of interest to model code officials and single ply manufacturers—particularly the latter who provide application design in addition to product design. But for the average architect and engineer the book is of limited value. There is little room for them to exercise design initiatives, forced, as they are, to conform to code requirements and manufacturer's requirements in order to obtain warranties. A designer for the average building, rash enough to embark on a design expedition even though armed with the author's sound engineering principles, may be shot down by code officials and manufacturers.

In a book so devoted to the mathematical aspects of roofing, it is disappointing to find fundamental errors, such as referring to membrane tensile strength in terms of psi rather than lb/in. Moreover, some conclusions that are proved mathematically are not substantiated by field observations. Some references are vague and do not quote the original author. References also suffer from the omission of acknowledged authorities on the subject. The photographs of failures are helpful, but they suffer from poor reproduction and a lack of clarity.

The book is a noble effort to provide a textbook for single-ply roofing systems, even though there is excessive emphasis on designing for wind uplift. It should prove to be of value to the single-ply roofing industry in that respect. But Mr. Phalen would have made a greater contribution to this specialized field had he been more comprehensive and written about the various materials and systems with respect to their installations.

Reference

[*1*] Griffin, C. W., *Manual of Built-up Roof Systems*, McGraw-Hill, New York, 1982.