BOOK REVIEWS

Adhesives, Adherends, Adhesion

Reviewed by John Eden, Engineering specialist, Rohr Industries, Riverside, CA. Member of ASTM.

REFERENCE: DeLollis, N. J., *Adhesives, Adherends, Adhesion,* Robert E. Kreiger Publishing Co., Huntington, NY, 1980, 352 pages, $26.50.

As stated in the preface, this second edition represents an updating of a 1970 publication entitled *Adhesives for Metals—Theory and Technology.* This new edition still includes the basics of adhesives, adherends, and adhesion as applied to epoxies, modified epoxies, durable phenolics, polysulfides, polyurethanes, silicones, acrylics, and other state-of-the-art adhesive materials.

New surface treatments discussed include phosphoric acid anodizing of aluminum and activated gas plasmas for cleaning and activating inorganic surfaces.

This book has two comprehensive chapters dealing with surface preparation and bonding of nonmetallic materials such as ceramics, rubbers, thermoplastics, thermosets, wood, and paper.

The practical aspects of the adhesive picture are summarized in two chapters on "Industrial Process of Adhesives and Bonded Assemblies" and "Industrial Applications."

Two chapters on conductive adhesives will be of particular interest to the electronic industry and of increasing interest in advanced composite bonding applications.

The scope of the book is very inclusive. It is well organized and has a very usable, definitive Table of Contents. The book is defmitely usable by those involved in adhesive technology while also being a good source book for the initiate in adhesives.

I particularly appreciate the very concise manner in which the book was written. The appendices covering definitions, standards, specifications for adhesives, and adhesive applications provide a ready source of often-used information.

In conclusion, the volume is recommended for both experienced and inexperienced adhesive technology personnel.

Structural Concepts and Systems for Architects and Engineers

Reviewed by Wiley Krapf, Research associate, U.S. Gypsum Co., Des Plaines, IL. Member of ASTM.

REFERENCE: Lin, T. Y. and Stotesbury, S. D., *Structural Concepts and Systems for Architects and Engineers,* Wiley, New York, 1981.

This book is directed at enhancing the architect and engineer's ability to make critical decisions about the structural frame of a building at the schematic and preliminary level of the design process. To this end, the reader is familiarized with architectural design concepts, the basic principles of how a building's shape and framing system affects its ability to resist external forces, highlights on the theory of designing simple-to-complex building elements and systems, and miscellaneous topics such as the construction techniques for and costs of various framing systems.

The format of the book is a condensed engineering curriculum embellished with examples of structural systems used in existing buildings, example problems using approximate design techniques and reference tables. The majority of the book, primarily examples of structural systems and the approximate design of structural elements, should be familiar material, and therefore not useful to the practicing architect and engineer. The material focusing on decision making at the schematic and preliminary level is somewhat unique and helpful. However, the authors have not suggested a complete method for effectively using their ideas.

In summary, the book does not seem to be useful outside a classroom environment where it can be supplemented by discussion or reference material or both.

Elementary Mechanics of Solids

Reviewed by Ralph Papirno, Mechanical engineer, Department of the Army, Army Materials and Mechanics Research Center, Watertown, MA. Member of ASTM.

REFERENCE: Singh, P. N. and P. K. Jha, Elementary Mechanics of Solids, Wiley, New York, 1981, ISBN 0470-27149-3, $19.95.

This book, which was written, published, and printed in India, is meant to be a textbook for a first undergraduate course in the mechanics of solids in Indian universities. In the preface, the authors claim that the only prerequisites required are some knowledge of mathematics and elementary statics. There are ten chapters and eight appendices containing approximately 500 problems for which 90 have full solutions and answers for the rest. Only SI metric units are used in the examples and the problems. The authors cover topics that are generally taught in undergraduate U.S. engineering schools in courses called "Strength of Materials," "Mechanics of Materials," "Elementary Solid Mechanics," and so forth. The book also contains information that is not generally part of such undergraduate courses.

In reviewing this book, I used several criteria: whether the text material would be attractive and appropriate for a first undergraduate course in solid mechanics in a U.S. engineering school; whether the book offers advantages over books currently available in this country in style and content; and whether there is a novelty of approach or a uniqueness of content which would better serve American engineering students of the 1980s and 1990s.

Overall, when I apply these criteria, I can only conclude that this is not a book for use in U.S. undergraduate studies. The authors are so thorough as to be tedious; they use a dry academic style that was popular up to the late 1930s and which was finally laid to rest in this country during the 1950s. In an attempt to be rigorous, the

© 1982 by the American Society for Testing and Materials

www.astm.org

concepts of stress and strain are introduced using the mathematical techniques of continuum mechanics. Contrary to the authors' belief that this is an advantageous approach, American undergraduates would flounder in Chapter 1 on trying to understand matrices, tensors, and partial differentials and their relation to stress and strain. Students could get no intuitive physical notion of stress and strain from the first chapter; rather these quantities have been reduced to the mathematical abstractions more appropriate for advanced courses. The authors, perhaps realizing that the student may be lacking in mathematical background, have devoted several appendices to fill in the gaps: there are summaries of matrix algebra, tensor analysis, and vector algebra and vector calculus. It is ludicrous to believe that any of this material would be of value in the context in which it is presented. Each of the topics could well serve as the subject of a separate course.

In an attempt to be modern, the authors have also included an appendix on computer programming with special emphasis on FORTRAN. As examples, they present programs for matrix multiplication, solution of simultaneous equations, and deflection of beams. Here again, to learn these techniques an American undergraduate would more likely need a separate course on the subject.

One final comment: the illustrations range in quality from adequate to amateurish. Oblique drawing rather than isometric or perspective drawing is used and the results are unattractive and stilted.

There is no reason why this book should be imported into this country from India; I doubt that there would be many buyers.

Engineering Design, Second Edition

Reviewed by K. L. Reifsnider, Assistant professor, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, VA. Member of ASTM and coeditor of the Composites Technology Review.

REFERENCE: Faupel, J. H. and Fisher, F. E., *Engineering Design, Second Edition,* Wiley, New York, 1981, ISBN 0471-03381-2, 1056 pages, $40.00.

The authors announce on the title page that this book is a synthesis of stress analysis and materials engineering; this important theme is developed well by the text. It is also an ambitious scope and that fact is reflected in the 1056 page length of the book. Fifteen chapters and four appendices are used to cover the subject. The book is well organized in the sense that it begins with basic materials information, progresses through material usually introduced in sophomore level strength of materials courses, and broadens into treatments of design when plasticity, notches, high temperature, impact loads, fatigue loads, and joints are present. Two salient features of the coverage are a chapter that deals with finite element and finite difference methods and a chapter that deals with composite, honeycomb, and reinforced materials. A more detailed discussion of the chapters follows.

Chapter 1 deals with "Materials and Properties." It introduces the concepts of strength, hardness, resilience, toughness, and so forth essentially from the standpoint of a uniaxial stress-strain curve. Comparative values of several properties are listed in several tables and graphs. The properties of springs made from different materials are discussed. The effect of temperature, strain rate, state of stress, size and shape, and environment on material properties is discussed and documented. The chapter ends with a development of special formulas for unusual geometries including multisphere pressure vessels and variable cross-section members.

Chapter 2 deals with "Tension, Torsion and Bending," essentially from the same perspective as one might find in the usual sophomore undergraduate course in "strength of materials," "deformable bodies," and so forth. However, various design-oriented additions are made including a discussion of the torsion of multicelled thin-walled tubes, statically indeterminate tensile frames, and the graphical method of moment distribution.

Chapter 3 deals with "Strength Under Combined Stress." This is a busy chapter with two major thrusts. The beginning of the chapter is devoted to two-dimensional developments of principal stress and strain concepts. Then, for two- and three-dimensional states of stress, equilibrium and compatability equations are discussed. The middle parts of the chapter are devoted to the discussion of stress states in a variety of components such as curved beams and tubes, beams and plates on elastic foundations, combined bending and torsion of springs, and thin- and thick-walled shells under internal pressure. The chapter closes with a very brief treatment of theories of failure, a disappointing presentation compared to the thoroughness in other sections.

Chapter 4 is entitled "Analysis of Composite, Honeycomb and Reinforced Materials." The chapter begins with a classical one-dimensional treatment of multimaterial beams and reinforced panels. Then orthotropic materials, including fibrous composites are discussed. (Several tables of properties are offered.) Laminated plate theory is introduced and several examples of comparative tensile, bending, and compressive properties are presented. Finally, sandwich structures (primarily plates) are analyzed. While the scope of this chapter is admirable, the treatment is thin, in my opinion, and the omission of thermal and moisture stresses in the laminate analysis leaves a major "hole" in that subject.

Chapter 5 deals with "Designing With Plastics," and is oriented towards the subject of creep and stress rupture. A one-dimensional theory of linear viscoelasticity is introduced, and the elements of rate theory are discussed for nonlinear or otherwise nonideal behavior. Some examples are discussed and creep properties of various plastics are compared.

Chapter 6 covers deformation "Beyond the Elastic Range;" plastic deformation is discussed. The chapter begins with basic one-dimensional elastic-plastic constitutive equations for deformations that are proportional and not reversed. Three-dimensional

stresses and strains are then introduced by use of equivalent stress (or strain) definitions. Then the theory of plane plastic strain (slip line theory) is briefly discussed, followed by a long section of examples, most of which involve limit analysis concepts. This treatment omits incremental plasticity, flow laws, and related concepts necessary to handle general problems of this type. However, there are some 60 pages of examples that are certainly helpful to the designer who wishes to get a reasonable estimate of behavior for practical situations.

Chapter 7 deals with "Energy Methods in Design" of structures. The concept of stored strain energy is introduced, along with virtual work, minimum potential energy, Castigliano's theorem, and complementary energy. Applications of many types are discussed. Flexibility/stiffness matrix methods are included. The chapter is extensive (if not unusual) in its treatment of practical cases.

Chapter 8 is an interesting and courageous effort to cover numerical analysis schemes involving finite elements and finite difference methods. It is to the authors' credit that they introduce basic concepts carefully and make good use of prior discussions of stiffness matrices, and so forth. And an early example serves to reassure the reader. But when the treatment moves to general stress analysis, the brief presentation (17 pages) is hardly adequate for a consequential presentation of finite element and finite difference concepts and leaves the reader unprepared to benefit in any substantial way from his effort, in my opinion. I applaud the courage of this effort but I am not convinced that it was successful.

"The Problem of Buckling" is treated in Chapter 9. Beginning with the usual Euler buckling theory, various working stress formulas are mentioned and plastic buckling is introduced. Then a variety of special problems are treated including the twist buckling of a column, the buckling of frames and trusses, and the buckling of stiffened plates and shells.

Chapter 10 discusses "Shock Impact and Inertia," primarily as a collection of special topics. It begins by indicating the effect of dynamic loading on material properties, touches on wave propagation phenomena (primarily scabbing of plates), vibrations, dynamic loading, impact (with some Hertzian impact theory), and dynamic response of viscoelastic materials, and ends with an admirable discussion of inertia effects, primarily in rotating plates. This latter section is easily the best such treatment this reviewer has seen in a comparable book.

Chapter 11 is called "Prestressing for Strength," but concrete designers will not be happy to find that the chapter deals entirely with internal stresses of the type usually found in metal structures. Shrink-fit construction, wound cylinders, plastic deformation—related residual stresses (such as those induced by autofrettage), overstressing, and machining stresses typify the treatment. The major attention is given to the shrink-fit problem, especially as it is applied to pressure vessels.

Chapter 12 deals with the subject of "Fatigue." The treatment is very brief and very classical, but a surprising number of subtopics are touched upon. Failure criteria for multidimensional stresses are introduced, but the treatment is essentially one-dimensional with applied stress-cycles to failure S-N curve representation as the basis for most of the discussion. There is a very brief section on data interpretation followed by some interesting examples.

"Notches, Holes and Stress Raisers" are discussed in Chapter 13. Stresses around circular and elliptical holes in plates, contact stresses, stresses in containers with holes, stresses around welds, and stresses near plastic zones are described. Design factors are mentioned.

Chapter 14 deals with "Brittle Fracture and Ductility." Fracture toughness concepts are introduced and the elementary aspects of classical fracture mechanics are described. Crack propagation is also briefly discussed, but the overall treatment is hardly adequate in the context of the present engineering importance of fracture mechanics, in the opinion of this reviewer.

Chapter 15 entitled "Thermal Stress Creep and Stress Rupture," discusses, in the authors' words, "the more or less ordinary effects that temperature has on the mechanical properties and behavior of materials." One of the most surprising, but welcome, parts of this chapter is a large section on thermal stresses and thermal residual stresses. The treatment of that subject is well organized and extensive. The subject of creep is also well developed with a well annotated discussion of numerous examples including rotating discs. A very brief section on stress rupture is also included, and thermal fatigue is mentioned.

There are four appendices which treat "Moments of Inertia," "Large Elastic Deformations," "Joints and Connections," and "Center of Gravity—Centroids," all useful developments.

This reviewer finds this book to be, overall, an excellent presentation of the material required for engineering design. The coverage is broad, technically sound, well documented, and refreshingly oriented towards the underlying philosophy (especially mechanics) rather than towards "blind" recipes. As I see it, however, there are several very serious shortcomings of the book. The treatments of fatigue, fracture mechanics, and the statistics of behavior and data interpretation are severely brief and incomplete and, in some cases, outdated. On the whole, considering the magnitude of the task undertaken, the results are certainly worthwhile; this reviewer recommends the book to designers and others interested in the mechancial behavior of materials and engineering components.

Housing, Climate and Comfort

Reviewed by G. M. Roeder, Associate research consultant, United States Steel Research Laboratory, Monroeville, PA.

REFERENCE: Evans, M., *Housing, Climate and Control,* Halsted Press, Division of Wiley, New York, ISBN 0470-26884-0, 1980, $39.95.

Libraries are filled with information; the difficult task for architects, and for others responsible for the design of houses, has always been to find data and practical methods for using the data to

assist in designing a house or a housing development so that the dwelling is optimally compatible with the local climate. There are many stacks of books and articles in the Medical and Human Behavior sections that present data on the metabolic process by which people produce heat and on the reactions people have to their thermal environment. There are also many stacks in the Geography and Earth Sciences sections that present arrays of data on the global climate as well as the microclimate related to a proposed building site.

Other books, scattered in different sections, present data on such seemingly unrelated topics as solar radiation, wind, the thermal behavior of construction materials, and the behavior of water vapor and the effects of moisture on buildings. In fewer than 200 pages, this book presents excellent concepts and data on all aspects of design related to climate and human comfort and offers practical methods that architects will find useful for analyzing data that are available to them. The author comments that the origin of the book was a study conducted in Nigeria by Carl Mahoney to develop standards for school design in different climatic areas of the country. Although the original work was biased toward hot climates, the scope of the book has been broadened to include data and methods useful for designing in climates that have both hot and cold periods.

As mentioned in Chapter 1, the contents of the book fall into three general subject areas: (1) the climate and techniques for collecting data needed to quantitatively describe a local climate, (2) the reactions of people to their thermal environment and the limits within which people feel thermally comfortable, and (3) the selection of a building site on the basis of climatic considerations and the design of houses to optimize thermal comfort. The first two areas are presented in Chapters 2, 3, 4, and 5, and the third area is discussed in Chapters 6 through 16. The book concludes with a review of total design in Chapter 17.

Chapter 2, "The Basic Data for Climatic Design," provides an excellent list of specific topics that would be basic to the general subject of climatic data such as dry-bulb temperatures that are recorded during monthly periods and can be characterized by a number of different means and extremes; mean daily minimum and maximum humidity; precipitation measured on a mean monthly basis as well as the number of days with rain per month and the probable peak-intensity rainfalls; direction, intensity, and frequency of wind for each month; and other weather phenomena. Examples of full-size data sheets are shown for recording information and for graphic analysis of the data. An excellent discussion is presented of the variation of climatic data depending on changes in elevation, distance from the sea, site locations in rural or urban areas, and changes in winds and breezes caused by local topographical conditions. The bibliography mentions several sources for meteorological information. (In the United States, very complete reports for all cities, "Local Climatological Data," are available from the U.S. Department of Commerce on a monthly subscription basis.)

Thermal comfort and the temperature/humidity limits within which most people feel comfortable are discussed in Chapter 3. This material is partially based on earlier work by B. Givoni, M. A. Humphreys, V. Olgyay, and others. The discussion is excellent, and several important indices of thermal comfort and thermal stress are reviewed in detail. The general subject of thermal comfort has been extensively researched during the past 40 years in the medical and related psychobiological fields. The reader should be aware that the ten books included in the reference section represent a very small part of the available books and articles devoted to this subject. The reader who wants to do further investigation will find that most of the books and journals, cited in the reference section at the end of each chapter, were published in England and may be difficult to find in the United States. The reader in the United States should be prepared to convert the International System of Units (SI) to English units throughout this chapter and the rest of the book.

Several specific aspects of local climatic conditions and world climatic types are discussed in Chapters 4 and 5. The simultaneous effect of air temperature, solar radiation, and wind speed on outdoor and indoor activities is analyzed for different times of the day so that favorable or unfavorable combinations of these factors can be used or avoided by a designer. Earlier work by Köpper on the classification of types (zones) of climates throughout the world is the primary basis of Chapter 5. It is emphasized by the author that the comparison of climatic data for a particular zone with the requirements for thermal comfort for a known socioeconomic client provides the basis for the selection of the appropriate building site, the building form, and the building materials.

The remaining two-thirds of the book is devoted to practical applications of the concepts previously discussed as they relate to the design of settlements or large housing developments. Chapter 6 presents a good discussion of the microclimate and how variations can be found in wind, rain, and solar radiation within short distances in a site study area. A great amount of useful information is given in Chapter 7 on how the form of dwellings can be designed to achieve a best fit between the inhabitants and the climate. The author emphasizes the importance of outdoor spaces and concludes that they should never be considered as leftover spaces that remain after the interior spaces are defined. Several simple concepts are discussed for thermal efficiency: (1) the volume of a building as it relates to its thermal capacity, (2) the surface area as it relates to the rate of heat transfer, and (3) the ratio of volume to surface as it relates to the approximate speed at which a building will gain heat during the day and lose heat at night.

The thermal properties of roofs and walls and interior walls and floors are discussed in Chapters 8, 9, 10, and 11. This section includes excellent graphic explanations of the thermal properties of materials, heat flow, time lag, and radiation. The author shows how interior walls with high heat capacity can be used to moderate the temperature within a house that is located in a climate with a high diurnal temperature range.

Windows and openings for sun and light and for air movement

and ventilation are reviewed in Chapters 12 and 13. The design of shading devices for window openings and the use of suncharts and sun path diagrams are also discussed. The requirements for ventilation are given relative to health ventilation and ventilation to cool the inhabitants and the structure. Mechanical aids ranging from room fans to integrated air-conditioning systems are discussed in Chapter 14. Condensation and its effect on building materials are discussed in Chapter 15. The author demonstrates practical graphic methods for predicting condensation on building surfaces and within construction and suggests where and where not to locate vapor barriers and thermal insulation in homogenous and nonhomogenous construction.

Chapter 16 reviews the main sources of internal heat gain: power sources, lighting, cooking, and occupants. The author suggests ways to control and reduce the heat gain from these sources. Chapter 17, the last one, presents a discussion of total design and reviews the way the unique characteristics of climate and the cultural traits of inhabitants have influenced the design of "traditional" houses.

The appendix section of the book includes an extensive array of information on the thermal properties of materials, solar radiation, wind, moisture, humidity, and water. Because the data are presented with only SI units, it would be very helpful to readers in the United States to have an SI-to-English conversion table.

This book, which is crammed with information and concepts that are presented in a rational manner, offers new insight into a difficult subject. The methods of analysis introduced in this excellent book should be useful in the design of houses or housing developments so that they will be more harmonious with the local climate and, therefore, more comfortable for the inhabitants and more energy efficient.

Handbook of Corrosion Protection for Steel Pile Structures in Marine Environments

Reviewed by H. E. Townsend, Supervisor, Corrosion and Coatings Research Section, Bethlehem Steel Corp., Bethlehem, PA. Member of ASTM Committee G-1.

REFERENCE: Dismuke, T. D., Coburn, S. K., and Hirsch, C. M., Eds., *Handbook of Corrosion Protection for Steel Pile Structures in Marine Environments,* American Iron and Steel Institute, Washington, DC, 1981, 245 pages, paperback, $9.00.

Marine structures such as bulkheads and wharves are generally anchored in place by steel, wood, or concrete piles. Steel piles in the form of H-sections, pipe, or sheet are widely used because of a favorable combination of properties and cost that facilitates economical construction of durable structures. The service life of steel piles exposed to aggressive marine environments may be limited by corrosion.

This book is intended to familiarize civil engineers and others involved in the design of new, and rehabilitation of existing, structures with the complex subject of corrosion and the various means of corrosion protection that are available to prolong the life of steel piles. It comprises a collection of ten sections and six appendices that were assembled by the Steel Pile Subcommittee of the Committee on Construction Codes and Standards of the American Iron and Steel Institute that is intended to provide a convenient state-of-the-art reference. Readers will find the handbook to be written in a clear straightforward style, well organized, amply illustrated, and with a useful subject index.

Section 1 by H. E. Preiser, "Factors to be Considered in the Use of Steel Piling in Marine Structures," gives a brief discussion of the factors involved in determining whether a particular structure will require some form of corrosion protection.

Section 2 by H. E. Preiser, "Fundamentals of Steel Corrosion," introduces the basic concepts and phenomenology of steel corrosion in marine environments. In particular, it describes the different environmental zones typically encountered by steel piles: atmospheric, splash, tidal, submerged, and soil.

Section 3, "Economics of Corrosion Control," by A. W. Peabody and W. F. Gundaker, is concerned with calculating the cost of corrosion control measures taking into account taxes and the time value of money. The methods are amply illustrated with examples.

The four basic approaches to corrosion control of steel piling are described by H. S. Preiser in Section 4, "Design and Fabrication Practices;" Section 5, "Steel Selection;" Section 6, "Jacketing and Coating;" and Section 7, "Cathodic Protection." Because, as noted in the book's preface, the sections by Preiser were authored in 1970 to 1971, most of the references provided predate that time. To help remedy this situation, the editors have added two more recent key references to the Jacketing and Coatings Section. Readers may also be interested in the portions on steel contained in the review by W. K. Boyd and F. W. Fink, *Corrosion of Metals in Marine Environments,* MCIC 78-37, Metals and Ceramics Information Center, Battelle Laboratories, Columbus, OH, March 1978.

Practical considerations in applying one or a combination of the four basic corrosion-control methods are given along with detailed examples of specific systems and associated costs in Section 8, "Compatibility of Combination Methods of Corrosion Control," and Section 9, "Technical and Practical Approaches to the Design of Corrosion Control Methods," by A. W. Peabody and W. F. Gundaker.

Section 10, "Rehabilitation of Steel Piles in Waterfront Structures," by T. D. Dismuke, deals with the evaluation, repair, and addition of corrosion protection to existing structures.

The glossary of corrosion terms given by S. K. Coburn in Appendix A will be useful to newcomers to the subject of corrosion, although it is not as extensive as that found in ASTM Definitions of Terms Relating to Corrosion and Corrosion Testing (G 15).

Appendix B, "Discussion of Corrosion Testing and Behavior of Steels in Marine Environments," and Appendix C, "Properties of Natural Waters," by S. K. Coburn, add to the subjects treated

BOOK REVIEWS

earlier in Sections 2 and 5. It is hoped that future editions of the handbook will be revised to combine all information on a given subject in a single section, thus omitting these appendices.

On page 185 of Appendix B, carbon steel is referred to as steel with less than 0.04% copper. It should be noted that in terms of corrosion resistance, carbon steel is usually defined as steel containing less than 0.02% copper.

Both Appendix B and Section 5 give data on the corrosion resistance of ASTM A517(F) (Unified Numbering System [UNS] K11576) steel. Recognizing that A517(F): (1) is a pressure-vessel plate grade that is not normally used for piling applications, (2) is a high-alloy version of A517 that does not have corrosion resistance representative of all 15 possible A517 compositions, and (3) is a high-strength steel that may be susceptible to cracking in the presence of certain environmental contaminants such as hydrogen sulfide, I believe these data should have been omitted.

Appendices D and E give dimensions and design properties for H, sheet, and pipe piles. Appendix F is a collection of ASTM Specifications for Structural Steel (A 36), Welded and Seamless Steel Pipe Piles (A 252), Steel Sheet Piling (A 328), High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality (A 572), and High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments (A 690).

This book will serve well as a convenient reference for engineers wanting to become conversant with the practical aspects of corrosion and the usual methods used to protect steel piles in marine environments.

An Introduction to Load Bearing Brickwork Design

Reviewed by Alan H. Yorkdale and D. C. Patterson, Vice president and assistant chief engineer, respectively, Brick Institute of America, McLean, VA. Members of ASTM.

REFERENCE: Hendry, A. W., Sinha, B. P., and Davies, S. R., *An Introduction to Load Bearing Brickwork Design*, Wiley, New York, ISBN 0470-27227-9, 1981, $48.50.

According to the blurb, this book is aimed at advanced students of engineering and new practitioners who are unfamiliar with the design and construction of structural brick masonry, that is, load bearing brickwork.

As promised in the blurb, the book is introductory in nature and provides basic information on the development of structural masonry; advice on the selection of materials, both bricks and mortar; a brief chapter on the properties of the assemblage of brick and mortar, that is, masonry; a chapter on the British Standard Code of Practice for Load Bearing Brickwork; and five chapters on individual design approaches, including: compressive loading, wind loading, lateral loads, composite action, and accidental loading. In addition, there is an example design calculation for a seven-story dormitory structure, produced in accordance with the British Standard of Practice for Load Bearing Brick Masonry (BS 5628).

In the reviewers' opinion, the book is totally "British," using only metric units and dimensioning practices. In addition, there is the problem of terminology differences (although a brief Glossary is provided), which tends to interrupt the reader's concentration while trying to determine the meaning of individual words.

Each section that deals with design contains an example design calculation, performed in accordance with the British Standard of Practice BS 5628. This is quite useful to the reader in understanding the somewhat different approach. Also, the complete design example in Chapter 10 is very useful in this regard.

The various calculation procedures consider most of the usual loading conditions, including a procedure for consideration of accidental overload (progressive collapse). They do *not*, however, address seismic design considerations.

Physically, the book is well-bound, on good paper, and clearly printed. However, many of the drawings are rather sloppy and amateurish, which detracts from an otherwise attractive package.

We, the reviewers, would recommend the book for practicing engineers familiar with U.S. and North American customs and design procedures for engineered brick masonry, as there are some slight differences in design approach and procedures familiar and in use in this country for many years.

In general, the book is an introductory work to existing technology that is currently not widely taught in the engineering and architectural schools, and therefore is useful. It is well organized, although it does offer some stumbling blocks via the language barrier. The authors are eminently qualified in the field of brick masonry research and design, as well as in the field of education. Their book merits careful consideration, by both engineering students and practitioners.