

BOOK REVIEWS

Design of Prestressed Concrete Structures

Reviewed by Theodore W. Coons, president, Spillman Co., Columbus, OH. Member of ASTM.

REFERENCE: Lin, T. Y. and Burns, N. H., *Design of Prestressed Concrete Structures*, 3rd ed., Wiley, New York, 1981, ISBN 0471-01898-8, \$29.95

The scope of the book covers the design of a variety of prestressed concrete structures including those normally considered to be both pretensioned, prestressed structures and those that are posttensioned, prestressed structures. It is clearly a book that is targeted to a broad spectrum of design professionals including practicing design engineers, in-plant engineers, professors, and students. The normal audience will also include certain developers and contractors who wish to explore from a technical basis the broad variety of design options for precast concrete.

This third edition written in 1981 is a broad expansion of the second edition which was originally published in 1963. During the 18 intervening years there has been a great accumulation of additional knowledge based on new research and experience with prestressed concrete both in the United States and throughout the rest of the world, and the authors clearly and concisely have updated the old material to the 1981 state of the art. Since the book includes a broad range of topics it is, indeed, sufficiently thorough to provide a basis as a major work of the prestressed concrete field. Since almost every chapter is provided with both design examples and additional problems to be solved, it is helpful to both the practicing design professional and the educator wishing to use this in either an undergraduate or graduate level course of study.

Mr. Lin, who is Board Chairman of T. Y. Lin International, certainly has a broad basis of experience as a design professional and along with his company has performed many projects throughout the world utilizing prestressed concrete. My one reservation about the text is that because of this direct "hands on" experience many of the references and photographs are of projects performed by T. Y. Lin International consulting engineers, and perhaps the book, therefore, is slightly biased to those projects and clients of T. Y. Lin. It could be enhanced by photographs and design examples from other professionals but this would have required additional research and would have created certain problems in compilation.

Throughout the book the authors have given appropriate credit for sources of information and have used a wide range of references. The book is very helpful in terms of presenting a significant number of design examples as well as appendixes that furnish additional data on prestressing systems.

Having used the second edition as a text during my own course of study I have found it useful and would expect that current students and design professionals will continue to use the third edition for many years in the future. My own personal bias is towards factory-cast prestressed concrete, and I do feel that if there is any

technical bias in the book it is towards posttensioned, prestressed concrete systems in the field. The only unanswered question in this field that is left unanswered in the book itself is the question of whether there are long term problems in using unbonded tendons in posttensioned, prestressed work. This may be a question that is well beyond the scope of the book and this review but is certainly of concern to many parties within the prestressed concrete industry.

The publisher, John Wiley and Sons, has done an excellent job in presentation, photography, layout, binding, and printing and this book is an excellent value in today's economy for design professionals.

Structural Use of Wood in Adverse Environments

Reviewed by Edward F. Diekmann, structural engineer, GFDS Engineers, San Francisco, CA. Member of ASTM.

REFERENCE: Meyer, R. W. and Kellogg, R. M., Eds., *Structural Use of Wood in Adverse Environments*, Van Nostrand Reinhold, 1982, 544 pages, hardcover \$42.50.

This book presents in a high quality, hardcover volume 37 papers presented at a symposium held at the University of British Columbia, Vancouver, B.C., 15-18 May 1978. As explained in the preface, "thirteen experts in their respective fields were asked to prepare a summary and extensive bibliography of the available information in their subject areas. A panel of practicing engineers was gathered to discuss their experiences in the evaluation of residual strength and repair of structures. In addition to these invited presentations, a more than equivalent number of contributed papers were selected for presentation." The book's chapters, despite the overall direction provided for the symposium, are the work of 37 authors and the quality and utility of the various chapters varies accordingly.

The papers divide themselves into several general categories, starting with broad background presentations by the invited experts on the effect on wood and wood-based products of temperature, chemicals, weathering, or microbiological and entomological attack. The overall quality of these background papers is excellent. Each in fact contains an extensive bibliography for those interested in pursuing a subject in detail. Much of this material has not been available before in a single reference.

A second group of papers cover in summary fashion the various loads and environments to which wood structures can be subjected. While a necessary adjunct as background to the original symposium, these papers offer little that is new or specific.

The third group of papers constitute technical reports on specific research into the behavior of a specific product subjected to a given adverse environment. This group might more appropriately have been placed in technical journals or included in summary form as part of much broader background presentations.

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The fourth group of papers can be crudely termed case histories and present either field experiences or design responses to the various environmental hazards covered in the background papers. Actual experiences are always valuable, both in defining problem areas and in the insights afforded into the design approaches and philosophies of other engineers.

The book does not provide a designer with criteria and does not offer solutions to the problems of designing with wood in adverse environments. What it does provide is a background for the designer to better understand some of the design problems of such an environment and some background upon which he can base design decisions so that the resulting structure will better cope with that environment. The book is decidedly overhyped by the publisher, but nevertheless, it should be in the library of most researchers and designers in wood. It is the "valuable source of information" the authors hoped it would be.

The Mechanics of Fracture and Fatigue: An Introduction

Reviewed by Norman E. Dowling and Hugo A. Ernst, Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, VA and Materials Engineering, Westinghouse Research and Development Center, Pittsburgh, PA, respectively. Members of ASTM.

REFERENCE: Parker, A. P., *The Mechanics of Fracture and Fatigue: An Introduction*, E. & F. N. Spon, London, published in United States by Methuen, Inc., New York, 1981, 192 pages, \$29.95 hardcover, \$14.95 paperback.

The book begins with four chapters that summarize linear elastic analysis of cracked bodies, including treatment of energy considerations, stresses and displacements, and determination of stress intensity factors. Following this there are chapters on mixed mode fracture and crack tip plasticity, which are mainly analytical, but which also briefly introduce some of the phenomenology of the physical process of fracture. The book concludes with chapters on fatigue crack growth and design against fracture. Less emphasis is given to the subject of fatigue than might be expected from the title of the book.

The material presented is often summarized to the point that additional explanation by the teacher, or additional reading, will be necessary for full understanding by the student. (Note that the length is only 192 pages). Given the subjects covered, the organiza-

tion is reasonably good. Hence, the main strength of the book is that it can serve as a useful guide, introduction and summary, for a course or self study review on the linear elastic mechanics analysis of cracked bodies. An important criticism is that the book gives the general impression that stress analysis is by itself the key to design against fracture. In practical situations, factors such as materials processing, limitations of nondestructive inspection procedures, unexpected structural loadings, and environmental effects on materials behavior may be of much greater importance than the inaccuracies in even a rough cracked body analysis. Some comments on specific portions of the book are given in the remainder of this review.

The chapter on energy considerations especially suffers from too concise of a treatment, and the explanation of fixed load versus fixed displacement is confusing. Determination of stress intensity factors and mixed mode fracture are given fairly complete and satisfactory coverage in the chapters on these subjects.

The chapter on crack tip plasticity and associated effects is weak. Inadequate coverage is given of analysis and test methods related to fully plastic fracture. Note that this area is important because of the need to obtain materials data on small, economical test specimens for use in fracture analysis of heavy section structures made of ductile alloys, as in ship structure and nuclear pressure vessel applications. The stress intensity expressions of Eqs 6.36 and 6.37 are valid only for certain ranges of dimensionless crack length/specimen width (a/W), these limits are not given and less restrictive expressions are available. (See ASTM Test for Plane-Strain Fracture Toughness of Metallic Materials (E 399), ASTM Test for Constant-Load-Amplitude Fatigue Crack Growth Rates Above 10^{-8} m/Cycle (E 647), and Ref 1).

The chapter on fatigue crack growth is too brief (14 pages) considering the title of the book and the importance and complexity of the subject. There are no references to test standards for obtaining and analyzing fatigue crack growth rate data, notably ASTM E 647. Stress intensities for cracks growing from notches need to be discussed from the viewpoint of long and short crack limiting cases, local notch stress fields, and plasticity limitations. Some additional discussion is needed of environmental effects, particularly effects on the crack growth exponent.

The final chapter on fracture mechanics design is a good summary with respect to the use of linear elastic cracked body analysis in design. The example problems and references to this chapter are excellent.

In conclusion, this book is recommended as a teaching and self study aid for cracked body analysis and design based on linear elastic assumptions. Supplementary material will be needed for advanced topics, such as plastic fracture, and for phenomenological aspects of fracture.

Reference

- [1] Srawley, J. E., in *International Journal of Fracture Mechanics*, June 1976, p. 475.

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Dynamics of Structures and Machinery

Reviewed by T. C. Huang, professor, Department of Engineering Mechanics, University of Wisconsin, Madison. Member of ASTM.

REFERENCE: Szuladzinski, G., *Dynamics of Structures and Machinery*, Wiley, New York, 1982, ISBN 0471-09027-1, \$45.95.

This book, *Dynamics of Structures and Machinery*, is comparable to most of the vibration texts in its contents. It consists of three parts: Part I—Single Degree-of-Freedom Systems (7 chapters), Part II—Multiple Degree-of-Freedom Systems (7 chapters), and Part III—Special Topics (5 chapters). These chapters are: (1) Calculation of Natural Frequency, (2) Dynamic Response of Basic Oscillator, (3) Nonlinear Vibrations, (4) Damping, (5) Vibration Isolation, (6) Shock and Impact, (7) Miscellaneous Problems, (8) Stiffness Properties of Elastic Systems, (9) Free Vibrations, (10) Dynamic Response, (11) Approximate Methods, (12) Response of Structure to Motion of Its Base, (13) Shock, Impact and Collision, (14) Miscellaneous Problems, (15) Bodies with Continuous Mass Distribution, (16) Geometric Stiffening, (17) Rotating Machinery, (18) Random Vibration, and (19) Generation of Dynamic Models.

Each chapter of this book has a collection of a large number of solved problems preceded by a concise and comprehensive presentation of a theoretical basis and is followed by an adequate number of exercise problems. The solved problems reflect the author's profound background and diversified, modern industrial experience. The concise theoretical basis makes this book a self-contained text. And the exercises, all with answers, serve as a learning tool.

The problems in the book are designed for manual work on a hand calculator to familiarize the reader with brief and relatively easy methods and approaches. Yet the foundation is set, such as in the formulation in terms of discrete elements and matrix notation, for the reader to use large scale computing and existing general purpose structural programs.

College students and engineers in industry, the two groups of readers this book aims at, will benefit greatly from this book, which is a valuable addition to the field.

Electronic Structure and Properties

Reviewed by L. C. Kimerling, Head of Materials Physics Research Department, Bell Laboratories, Murray Hill, NJ.

REFERENCE: Fradin, F. Y., Ed., *Electronic Structure and Properties*, Treatise on Materials Science and Technology, Vol. 21, Academic Press, Inc., New York, 1981, \$51.00.

In his Foreword to this volume, Series Editor Herbert Herman notes that materials science has advanced through contributions of chemistry, physics, metallurgy, ceramics, and polymer science. This text clearly defines the contributions of the physics commu-

ity. As Hume-Rothery noted in his anecdotal book *Electrons, Atoms, Metals and Alloys* in 1963, a threshold in the science of materials will be crossed with the understanding of electronic structure. This text documents this achievement and the corresponding advances in experimental technology and electron theory.

The first chapter by A. J. Freeman contains a critical discussion of theoretical approaches to the calculation of energy bands in solids. The methods represent approximations which reduce a many body problem to a one electron problem. Each formalism is presented with the purpose of the construct, the underlying physics, and the strengths and weaknesses of the result. In particular, the derivatives of the very successful Hohenberg-Kohn-Sham local density formalism are included. Freeman notes quite properly that this approach yields a single particle expression which self-consistently relates ground state charge densities to the potentials of the electronic system. However, the solutions relate only to observables which are a sole function of the ground state charge density. Typically, the materials system is studied by perturbing the electronic ground state. The resulting excitation energies are properly represented not by differences in eigenvalues, as in standard band theory, but by calculation of both the ground and excited state configurations. This point, which has been overlooked by some practitioners in the field, exemplifies the thorough fundamental coverage of the chapter.

Freeman delineates successes in ab initio calculation of physical properties such as lattice constant, cohesive energy, and bulk modulus in a variety of materials systems and electronic configurations. The chapter ends with the only serious omission being a discussion of amorphous solids and defects in crystalline solids. This area, which is characterized by initially undefined atomic positions, is quite accurately referred to as "one of the greatest challenges facing solid state physicists today."

The second chapter covers the central experimental technique, photoelectron spectroscopy, as a probe of electronic structure. This excellent discussion by B. W. Veal begins with the discovery of the photoelectric effect at the turn of the century and traces developments to the present day. The field is developing at such an accelerated rate that a recent important discovery, the inverse photoemission technique [1], succeeded the publication data. A physical background is developed that leads to the construction of band structures and density of states relations from photoemission data. A summary of all techniques is given with applications to valence and core electron states in a wide variety of material systems. The theoretical foundation for the application of photoemission data (electron binding energies versus intensity) blends well with the coverage of Chapter 1.

The role of electronic structures in the electron-phonon interaction is presented by W. H. Butler in Chapter 3. The introduction contains the standard textbook approach employing the Boltzman transport equation. Many body interactions are then introduced to provide a basis for discussing superconductivity. An ample coverage of formal theory by equations is presented, but the approach forms a good basis for the understanding of physical trends and experiments. Butler concludes with five "controversial" rules

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for the development of high temperature superconductor materials which are supported by reasonable physical arguments.

Chapter 4 features a discussion of the elastic properties of transition metals by S. G. Steinemann and E. S. Fisher. The introduction contains basic definitions and experimental approaches in the field. The theoretical foundation is historical with lucid simplicity. The concept of the deformation potential is developed theoretically with supporting experimental results. The review of results in various materials systems is not as unified as in other chapters, but a summary at the end of each subsection satisfies this role.

In Chapter 5, Z. Fisk and G. W. Webb discuss the measurement of electrical resistivity as an experimental probe of electronic structures. The chapter follows the structure of the book: an introduction to physical principles, a discussion of generic systems, a summary of current results, and a guide to application of the method. The coverage is clear and complete, omitting only a description of the sliding charge density wave mechanism.

The final Chapter 6 by P. Jena discusses methods for the treatment of point defects in metals. The introduction provides a complete coverage of formalisms with the advantages of each. The comparison with experiment features two generic defects: the interstitial (hydrogen atoms) and the lattice vacancy. The dominant approach here is the jellium model that works well in the metal systems. The chapter is a good introduction for any scientist considering the point defect problem. As above, omissions are found in only the newest directions. Jena refers to the promise of Green's function approaches with the important recent citations. Results in this area, particularly in semiconductor materials, have been very fruitful.

Fradin has done an excellent job in editing this volume. The references are complete. Each chapter lists recent reviews without recapitulation. The structure of the book is unified with each section following a similar format. The illustrations are well conceived, including both instructive, generic drawings and relevant experimental data.

Scientific texts fall into several categories: textbooks for the student, topical reviews covering specialized aspects of a broad field, and treatises that feature a methodical discussion of facts, principles, and conclusions in a currently active area. Volume 21 in the Materials Science and Technology series admirably fulfills the third role. This collection of six review articles is unified in both structure and content. Formal pedagogy is avoided while maintaining a rather complete coverage of the subject. This volume should be of value to both theoretical and experimental solid state physicists as well as the spectrum of materials scientists working in related fringe areas.

Reference

- [1] Woodruff, D. P. and Smith, N. V., *Physical Review Letters*, Vol. 48, 1982, p. 283.

Polymer Degradation—Principles and Practical Applications

Reviewed by Raymond A. Kinmonth, Atlas Electric Devices Co., Research and Development, Chicago, IL. Member of ASTM.

REFERENCE: Schnabel, W., *Polymer Degradation—Principles and Practical Applications*, MacMillan Publishing Co., New York, 1982, 200 pages, \$32.00.

Here is an excellent introductory text to polymer degradation. Professor Dr. Wolfram Schnabel has used his lecture course on Degradation and Stabilization of Polymers given at the Technische Universität Berlin as the basis for this book. The objective, as stated in the preface, to present a concise treatment of the various factors causing chemical changes in polymers resulting in a deterioration of their physical properties has been achieved. If there is to be any serious criticism of this book it will probably be that Dr. Schnabel has been too brief. However, we must keep in mind that it is not the author's intent to dwell at any length upon a given subject, but to survey the subject, cite some supportive examples, and provide the reader with references for further study.

Not only has Dr. Schnabel grouped his subject matter under the usual classifications of Thermal, Mechanical, Chemical, and Photodegradation, but he also devotes chapters to degradation by High Energy Radiation and by Biodegradation while including under these categories specific discussion on ablation, heat effects in biopolymer, ultrasonic, and applications such as electron and X-ray resists in microelectronics. To cover such a spectrum of topics in 200 pages requires careful editing of subject matter.

Professor Schnabel does not waste words. We can see the careful preparation of the lecturer to present the subject matter within the allotted framework of the lecture period. In the first chapter, titled Introduction, the author deals first with definitions, a page and a half devoted to modes of polymer degradation and four pages discussing mechanistic aspects. The chapter is completed with a discussion on detection of polymer degradation. Each succeeding chapter dealing with a specific topic begins with an introduction before discussing the various aspects of the subject.

The author has a style that moves the reader along without slowing for extraneous detail. Applications are selected to support the more abstract discussion. Tables and figures are used liberally to enhance the text. The reader is frequently guided toward further reading by having his attention drawn to specific references of which there are nearly 600.

As an introduction to a broad subject this book is most useful as a text to introduce the student to polymer degradation. It is recommended to those in industry with little or no experience in this area who have a need or a desire to learn.

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Building Design and Construction Handbook

*Reviewed by Morris Lieff, County College of Morris, Dover, NJ.
Member of ASTM.*

REFERENCE: Merritt, F. S., Ed. in Chief, *Building Design and Construction Handbook*, fourth ed., McGraw-Hill, New York, 1982, 1472 pages, \$75.00.

This handbook for the building and construction industry is a valuable reference source for contractors, engineers, architects, building officials, and other professionals involved with building construction, systems, and materials. It consists of 26 sections written by 22 contributing authors. Each section is written for the nonspecialist in the field. This fourth edition has increased substantially in physical size, growing from 1098 pages of the third edition, to 1476 pages in this current edition. The print appears more readable and more legible. The type is heavier, there is greater spacing between the lines (one-eighth less lines per page), and the subheadings are highlighted in a greatly improved manner.

There are three new sections: on Building Systems, Protection of Structures and Occupants against Hazards, and Lighting. The section on Building Systems introduces other sections of the book as well as presenting the concept of system design for producing better buildings with lower life-cycle costs. The section on Protection of Structures and Occupants against Hazards deals with how to protect against the effects of wind, earthquake, fire, lightning, water and flooding, and intruders. The new chapter on Lighting, by a new contributor to the handbook, greatly expands the brief treatment in the third edition and also contains useful treatment of daylighting.

Three sections, namely, Soil Mechanics and Foundation, Cold-Formed Steel Construction, and Heating, Ventilating, and Air Conditioning have been rewritten and updated by new authors. The sections on wood, steel, and concrete have been revised. There has been some revision in the organization of the handbook. For example, sections dealing with Systems for Enclosing Buildings, namely, Walls and Partitions, Windows, Doors, and Roof Coverings are presented contiguously. Thermal Insulation is incorporated into the section on Heating Ventilation and Air Conditioning; Insurance and Bonds are incorporated into the section on Construction Management and Sprinklers have been moved into the section on Plumbing. Essentially most parts of the book have been updated.

Another very useful addition is an eleven-page appendix "Factors for Conversion to the Metric System (SI) of Units." About one fourth of the 26 sections of this book have bibliographies appended. Where present they are compilations of books of related interest. Unfortunately the publication dates of the reference books are missing. There is a very thorough and comprehensive 48-page index, the readability of which has been greatly enhanced over that of the third edition because of a 25% increase in type size.

In summary, this handbook is highly recommended as a comprehensive reference book to the nonspecialist in the building and construction community.

Detection and Measurement of Hazardous Gases

Reviewed by William E. Oatess, O A Laboratories, Inc., Indianapolis, IN. Secretary of ASTM Committee D-22 on Sampling and Analysis of Atmospheres.

REFERENCE: Cullis, C. F. and Firth, J. G., Eds., *Detection and Measurement of Hazardous Gases*, Heinemann Educational Books Inc., Exeter, NH, 1981, ISBN 0-435-71030-3, hardcover \$35.00.

This book consists of seven chapters which were each authored by different people and dealt with different aspects of the overall subject. Therefore it seemed appropriate to try to have various people who had special experience and knowledge of these various subjects review the chapter that dealt with his special area. This approach resulted in seven separate reviews which I will try to pull together into a single comprehensive review. (See Table 1 for the individual reviewers.)

The scope of this book was presented in the preface as intending to help people, who are concerned with measuring hazardous gases, to understand more fully the advantages and limitations of particular techniques when applied to individual situations. The book is not intended to be an encyclopedia of all possible measuring methods and means of interpreting such measurements but discusses the techniques that are most likely used at present and are most likely to be used in the future. It is hoped that it will help the reader to decide the appropriate technique to use for a par-

TABLE 1—Review contributors.

Chapter	Reviewer
Preface	Benjamin Levadie, retired from Vermont Department of Industrial Hygiene Robert S. Saltzman, E. I. du Pont de Nemours & Co. Arthur Boehm, United Technologies, Inc. John V. Crable, National Institute for Occupational Safety and Health Robert C. Magor, Environmental Protection Agency Stuart Hunter, Princeton University John K. Taylor, National Bureau of Standards
Contributors	
Introduction	
1. History and Law	
2. Measurement of Flammable Gases and Vapours	
3. Oxygen Deficiency	
4. Monitoring Toxic Gases in the Work Place	
5. Personal Monitoring	
6. Statistical Aspects and Air Sampling Strategies	
7. Standard Atmospheres	

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ticular problem and to understand what the measurements mean in terms of the hazard present.

The general opinion that was reflected in the comments of all the reviewers seemed to be related to the state of the art that was expressed in this book, that is, that it was slightly behind what we were accustomed to seeing in this country. Some of the concepts concerning toxicological effects that were presented are now considered by the reviewers to be overly simplified and too vague. If novices were to use this book as a guide, such as it was intended to be, they could be misled. As an example of oversimplification Reviewer 1, Benjamin Levadie said:

The statement that acute exposure effects are reversible, unless they are fatal, is quite wrong. A single acute, nonfatal exposure to hydrochloric acid or nitric acid gas may not prove to be fatal but is known to have potential for a lifelong morbidity effect on the exposed individual. An acute, single exposure to a critical oxygen deficiency may not necessarily prove to be fatal but can nevertheless be responsible for serious brain tissue damage. We are only now becoming aware of the subtle, cryptic, long-term effects of massive single exposure to crocidolite fibers.

As an example of vagueness Levadie said: "It should be made clear that the charcoal tube sampler is *not* a measurement device. It is a sample collecting device. The measurement is made by some form of gas chromatography, mass spectroscopy, or other system or combination of detection routines. Absorbents do not measure. They collect."

About Chapter 1 on History and Law, Levadie said

The treatment of History is synoptic but good. It has at least one severe shortcoming in that it does not recognize the enormous impact that such workers as Edith Hamilton had on Industrial Hygiene. Her work and her historical importance far outweighs that of all of the others cited. One, perhaps lesser misstep, concerns the writer's (J. H. Bourgoyne) narrow conception of the role of the "chemist" in industrial hygiene and in air quality control work generally. Not only does the chemist play a definitive role in the detection of toxic contaminants, but also in the evaluation of toxins and in the consultative aspects which are vital to the correction of industrial hygiene problems which are caused by chemicals. Indeed, the chemist is the key to effective resolution of problems created by the intrusion of noxious vapors and gases into workplace and also ambient atmospheres.

The presentation of the physiological effects of oxygen deficiency seems to reflect the author's strong background in the mining industry. However, it does not represent the situation wherein oxygen monitoring is most often needed—general industry, for confined space entry. An instrument manufacturer states that only 15% of their oxygen meter sales go to the mining industry. The vast majority is for general industry. Unfortunately, the author's presentation of "gradual" effect of oxygen deficiency masks the severity of the hazard and may mislead a novice into thinking he can depend upon his body to provide adequate warning. This is not consistent with an opinion presented in a reference used by the author.

The author's equipment review presents both old and modern technology and seems to be well-rounded. The author makes a very good point with his suggestion of reading the partial pressure of ox-

ygen, rather than the percent scale which is presently used. This is a point that could be well taken by equipment manufacturers.

Although the book was intended to be primarily a reference book it received some criticism that it did not contain tables of comparative information to enable a user to make selections of methods and equipment. For some monitoring methods, the advantages are given, for others disadvantages are given and for some the sensitivities are given. There is little technical information on interferences, specificity, size, weight, battery life, advantages, disadvantages, and so forth.

Overall the chapter on statistics is pretty good. There are only a few disagreements over terminology and applicability of techniques. However, from a mechanical aspect there was a problem in this chapter in that the square root sign did not fully print, causing some confusion. There is also an error in an example in this chapter. Reviewer 7, John Taylor, states

Chapter 7 deals with the preparation of mixtures of gases and vapors for calibration purposes. This reviewer deplors the use of the term "standard atmospheres" for such substances. The author recognizes that this terminology is incorrect, yet elects to use it anyway.

Taylor also says:

Methods of preparation are considered only in the most general of terms which will be of marginal help to bench chemists. Rather, the literature references will need to be consulted for any details. These appear to be meager in that many important references are unknown to the author or ignored. For example, little mention is made of the National Bureau of Standards (NBS) work on standard reference material gases nor are the recent ASTM and ISO standards referenced. The preparation of primary standard gas mixtures by gravimetry is not discussed and the important permeation tube standards are not highly regarded.

As his final summary of Chapter 7, Taylor states, "There is a lot of useful information in the chapter but there is a lot missing, as well. The reader should consider it as an introduction to the preparation of gas mixtures and not state of the art."

In the overall review of the book and the comments by the various reviewers this last statement might well be applied to the book in that it contains a lot of useful information but there is a lot missing as well. The reader should consider it as an introduction to the field of detection and measurement of hazardous gases.

Simplified Design of Building Trusses for Architects and Builders

Reviewed by George D. Ratliff, Jr., U.S. Steel Corp., Research Laboratory Monroeville, PA. Member of ASTM.

REFERENCE: Parker, H. and Ambrose J., *Simplified Design of Building Trusses for Architects and Builders*, 3rd ed., Wiley, New York, 1982, ISBN 0471-0722-4, \$27.95.

The late Harry Parker is remembered by people in the building trade for his popular handbooks on architectural engineering sub-

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jects. The books contained beautifully detailed drawings and concise explanations of the engineering. Like Diderot's 18th century encyclopedia of the arts and sciences, Professor Parker's early 20th century books will remain a valuable historical records of construction practices.

Understandably, John Wiley & Sons has an interest in making this book more than a historical record. The third edition was prepared by Professor James Ambrose. Although presented as a revision of Parker's second edition, only a two-page preface is retained. The other 305 pages are new.

Of course there is no place in a modern handbook of trusses for material from the earlier editions. During the last 30 years there has been a revolution in truss practices, and the new trusses have in turn revolutionized construction. No single development in housing has had more impact on the cost of the shell of a house than the prefabricated wood truss with its steel connector plates. Similar changes have occurred with prefabricated steel bar-joint trusses for commercial buildings. Also, a highly successful hybrid steel and wood truss was developed for commercial buildings. Many new developments are mentioned in the new book.

Like the earlier editions, the third edition is a concise explanation of the engineering required to analyze trusses. Unlike the earlier editions, the new book emphasizes the algebraic rather than the graphic method of analysis. This is timely because it is better suited to computers.

But alas, the new book does not truly chronicle the current activity in the field. While the new developments are mentioned, they are not adequately described. For example, there is only one small sketch of part of a "toothed plate for use as a gusset for a wood truss," hardly the attention it deserves. In general the new concepts were dismissed as being patented, as if this somehow removes them from consideration.

Admittedly many of the new inventions, while simple and economical to use, are a devil to analyze. But this is what architects and builders need to know when they select and approve the products. Modern truss products are designed using a combination of analysis and testing. Testing has become important both in the development and approval of the products. Since trusses have a worse failure record than most building products, it is time we acquaint the users with the problems and pitfalls of testing. For example, were the test samples typical delivered products or were some carefully selected by the manufacturer? Were tests of wood trusses conducted too quickly to evaluate snow-load conditions? Were wind uplift conditions evaluated? A book on the simplified way to design trusses should have had some discussion of testing methods.

Structural Masonry Designers' Manual

Reviewed by Alan H. Yorkdale, vice president, Engineering and Research, Brick Institute of America, McLean, VA. Member of ASTM.

REFERENCE: Curtin, W. G., Shaw, G., Beck, J. K., and Bray, W., *Structural Masonry Designers' Manual*, Sheridan House, Inc., White Plains, NY, 1982, ISBN 0246112085, 498 pages, \$85.00.

This manual was begun in the structural engineering practice office of W. G. Curtin Partnership, to be used as a training aid and to establish criteria for the office procedures. The need was perceived by the Partnership since the young engineers coming out of school and entering the practice of engineering had very little knowledge and no background in the design of structural masonry. Hence, the manual was developed over many years as an office training document.

At the present time, the book is based on over a quarter of a century of successful practice of structural engineering and design experience in structural masonry. If pressed for a two-word description of the book, it would be "practical" and "complete."

Curtin et al begin with the fundamentals of design and design philosophy, and build to a complete dissertation on structural masonry of all types. Each section is begun with a clear statement of the structural principles involved in the section, and proceeds to develop and illustrate these principles. There is also the recognition that there may be other solutions or other choices than those made by the examples.

The book itself is an extremely handsome package, approximately 9 by 12 in. and cloth bound; even the dustcover is nice-looking. The paper is excellent, the type size and style are very clear. The illustrations, all line drawings, are very clear, well done and faithfully reproduced.

Clear examples in cases of each of the principles mentioned in the book are provided with complete illustrations and the calculation procedure for the example. It is, as stated in the promotion material, possible to enter at the beginning as a total novice in structural masonry design and emerge at the end of the book with an excellent knowledge of the subject and the capability to accomplish designs.

The single drawback, as far as U.S. audiences are concerned, is the presentation of all of the examples and all of the formulas in metric SI terminology. The reviewer recognizes that few U.S. structural engineers are totally conversant with this system, and therefore suggests a handy conversion table when utilizing this volume.

In general, the reviewer recommends this book highly for the consideration of any who wish to learn about structural masonry design. The few problems of language and the orientation toward the British Code are minor distractions when one considers the amount of information and background to be gained.