BOOK REVIEW

Concrete Structure, Properties, and Materials, 2nd Edition

Reviewed by Douglas E. Volkman, Technical Staff Member, University of California, LANL, Los Alamos, New Mexico 87545.

REFERENCE: Mehta, P. K. and Monteiro, P. J. M., *Concrete Structure, Properties, and Materials, 2nd Edition*, Prentice Hall, Englewood Cliffs, New Jersey, 1993.

As with many sequels, this book is good, but falls short of the level of excellence established in the first edition. For technical content, the second edition is a reference worth owning. The three major parts of the book deal with material science, construction and technology, and special topics, which is the same format used in the first edition.

Part I, entitled, Structure and Properties of Hardened Concrete, is a well-written treatise of the material science of concrete. The information is presented in a clear and understandable fashion. The test questions at the end of the chapters are probing and comprehensive in nature.

The subject of Part II, Concrete Materials, Mix Proportioning, and Early-Age Properties, deals with the construction and technology of concrete. The topics covered represent a fairly extensive review of the state-of-the-art. However, caution must be used when quoting this text verbatim since, for example, an error in reference to the Test Method for Reboiling Tendency of Sheet Steel for Porcelain Enameling (ASTM C 632) was noted in Chapter 7.

The book presents Part III as, Recent Advances, and Concrete in the Future. The preface states that Chapter 11 contains "up-to-date" information, but the section on Heavyweight Concrete for Radiation Shielding in that chapter relies on old research literature and does not reference the ASTM symposium on radiation shielding material, held in June 1991. Also, Chapter 13 includes a section titled, Advantages of Concrete Over Steel Structures. This section states that concrete is more resistant than steel to cyclic loading. This is completely misleading. Professionals dealing with seismic issues know too well how the lack of ductility in older, concrete frame structures, or in unreinforced concrete buildings are much more vulnerable than steel structures designed in the same era. The book, in this instance, took a grain of truth about fatigue and provided misleading conclusions by not presenting the more important issue of energy absorption in structures.

In summary, the book has several failings, but considering the book in its entire context, the reader should find this a useful reference in which information is readily accessible and easily understood.

BOOK REVIEW

International Conference on Corrosion Protection of Steel in Concrete

Reviewed by P. Kumar Mehta, Emeritus Professor of Civil Engineering, University of California, Berkeley.

REFERENCE: Swamy, R. N., *International Conference on Corrosion Protection of Steel in Concrete*, University of Sheffield, Sheffield, 1500 pages.

The proceedings of a recently concluded *International Conference on Corrosion Protection of Steel in Concrete* are now available from the Conference Secretariat of the University of Sheffield, Department of Mechanical and Process Engineering, Sheffield, S1 3JD, United Kingdom. The two-volume, hard-cover set, containing 128 reports (over 1500 pages) grouped under six conference themes, is handsomely produced.

The papers in the first volume covers two themes: (1) studies on *in-situ* reinforcement corrosion and (2) testing for corrosion and service-life prediction. The *in-situ* corrosion studies contain useful information from several case histories. There are also two excellent review papers, one by Broomfield on electrochemical corrosion measurement methods and the other by Rodriguez et al. on assessment of structural performance of corrosion-damaged elements. Jones et al. authored an excellent report showing the limitations of service-life prediction methods, such as the dependence of chloride diffusion rate on the presence of sulfates and carbonates in concrete.

The papers in the second volume, covering four themes, are in the general area of corrosion protection. The largest number of papers are in the area of corrosion protection by the use of chemical and mineral admixtures in concrete. Although most of the information presented is not new, it is confirmed that permeability of concrete, depth of carbonation, and steel corrosion rates are significantly reduced by the application of superplasticizers and mineral admixtures, such as fly ash, granulated blast-furnace slag, natural pozzolans, and silica fume. Also reported are the results of studies on the use of corrosion inhibitors, such as alkanolamines, amino-carboxylates, and calcium nitrite.

Corrosion protection through the use of coatings and membranes is discussed in several reports including a review paper by Fluekiger et al. The authors found no correlation between laboratory and *in-situ* tests. The authors also found that, with an increase in cyclic humidity, coatings can be detrimental by varying the chloride levels at the steel surface. However, Tanikawa and Swamy reported positive results from the use of an acrylic rubber-based coating. Many reports discuss the results of studies on corrosion protection provided by the use of coated and or nonmetallic reinforcement. Most of the papers discuss performance of epoxy-coated steel. Also, there is an excellent report by Short et al. on the performance of various zinc alloys, such as Zn-Ni and Zn-Co.

The last group of papers deal with cathodic protection by chloride removal and realkalization of concrete in structures already suffering from chloride corrosion damage. Theoretical and practical considerations are discussed in a review paper by Das and the mechanism of realkalization is discussed by Banfill.

As corrosion of reinforcing steel is a serious world-wide problem requiring heavy expenditure for repair and replacement of structures, the wealth of information contained in this publication should prove useful to both researchers and field engineers concerned with the issue. Dr. Swamy has done an outstanding job as the editor of the volume. According to him, only a limited number of copies were presented and a few are still available at a cost of £ 100 (British pounds).

BOOK REVIEW

Concrete Technology: Past, Present and Future

Reviewed by R. N. Swamy, University of Sheffield, Sheffield, United Kingdom.

REFERENCE: Mehta, P. K., Ed., *Concrete Technology: Past, Present, and Future*, ACI SP-144, American Concrete Institute, Detroit, 683 pages, 1994.
Library of Congress Number: 94-70305
Price: $50.50, ACI Members: $40.50

Several symposia have recently been held to honor and pay tribute to those who have made outstanding contributions in the field of cement and concrete through research, education, or design and construction. This publication is the outcome of such a tribute to Mohan Malhotra, held during the American Concrete Institute (ACI) Convention in San Francisco in March 1994. Mohan is an exceptional person: he has led the field of concrete technology for over three decades, through research and development in material behavior, testing, and in generally advancing our knowledge and understanding of concrete and concrete materials. The greatest contribution that he has made was in identifying the role of industrial by-products such as fly ash, slag, and silica fume as an essential component of concrete, and in communicating and transferring this new technology, with its global energy and resource implications, to the wider world through conferences and symposia organizing, in which he has shown outstanding managerial abilities and tact.

This publication and its title truly reflect the scholarship and vision of Mohan Malhotra and the richness and variety of his research work and thinking. The papers taken together portray the great strides that have been made in the past, the achievements generated in controlling deterioration and enhancing the durable, serviceability behavior of concrete structures, and the exciting role that concrete can play in the design and construction of off-shore and marine structures, roller compacted concrete dams, bridges, highway structures, and other infrastructure construction.

There are 18 review papers and 12 research papers included in this proceedings. International in character and global in their relevance and subject coverage, this itself is a reflection of the esteem and respect that the peers of Mohan have for his input into concrete technology. In broad terms, the contents of these papers fall into four categories. Four papers present a world-wide overview of the status of concrete technology today and the likely course it will take in the 21st century. Durability has been at the forefront of all research in the past decade or so, and ten papers are devoted to this area that is currently exercising the minds of all involved in concrete in some form or other. Ten papers address problems related to construction technology, materials, and concrete products, and materials of the future such as new cements, superplasticizers, mineral admixtures, fibers, and polymers are critically assessed. Mixture proportioning, testing methods, and quality assurance are featured in the last six papers. Nondestructive testing, to which Mohan has contributed so much, is most effectively addressed in an extensive survey that describes its history and the challenges it poses.

There are few currently available publications that so admirably trace the history of concrete technology, critically evaluate its achievements, address the problems and challenges it poses, and show the way forward to enhance the quality of construction that could lead to a better and richer life. Concrete materials are global; the authors of the papers in this volume are international and the thinking and vision expressed are universal. This is a book that should adorn the bookshelves of every student of concrete technology, whatever be his or her status.