

BOOK REVIEW

Fundamentals of Portland Cement Concrete

Reviewed by William J. Head, associate professor of civil engineering, Department of Civil Engineering, West Virginia University, Morgantown, WV 26506.

REFERENCE: Popovics, S., *Fundamentals of Portland Cement Concrete: A Quantitative Approach Volume I: Fresh Concrete*, John Wiley and Sons, Inc., Somerset, NJ, 1982, \$56.95, 477 pp.

Sandor Popovics' latest book represents a wide-ranging effort aimed at "... construction engineers; consultants; research and testing laboratories; students; design offices; and at the large number of technologists, engineers, and architects working with concrete," that is, practically everyone who deals with or might deal with concrete. The scope of the book is restricted to fresh concrete. The author considers cement paste, mortar, and concrete as fresh "... up to the point in time when the hydration begins to affect the rheological properties of the mixture."

In the preface, the author infers a degree of uniqueness in his presentation of the topical material. He notes that the book content is focused on mechanical properties of concrete while numerical relationships and explanations of the observed phenomena are emphasized in his presentation methodology. Further, the author states that the purpose of his quantitative approach is to "... offer formulas acceptable for laboratory or practical use, for computers, and for automation, and also to provide a basis for further improvement of concrete technology."

The reviewer believes that the author has produced a helpful and needed reference work for concrete technologists which serves to agglomerate very valuable, at times arcane, existing knowledge. The book complements Professor Popovics' earlier work, *Concrete—Making Materials*, published in 1979. Some minor overlap exists between the two volumes. That the present book is thorough in covering the topic of fresh concrete is indicated by a survey of chapter headings that include, in order and following an introductory chapter, the following: Rheology of the Freshly Mixed Cement Paste; Consistency, Workability, and Rheology of Fresh Concrete; Factors Affecting Concrete Consistency; Air Content—Segregation and Bleeding; Composition of Concrete. Unit Weight. Other Properties; Proportioning of Concrete; Production of Concrete; Pump-

ing, Placement and Vibration of Fresh Concrete; and Setting. Sampling.

The book is reasonably well organized; the illustrations and tables are clear, informative, and of good quality. The table of contents and the indices are comprehensive and easy to use. The author has included helpful numerical examples throughout the text and, additionally, a list of discussion topics that aid the reader in applying the concepts presented in the chapter on proportioning of concrete. The book is replete with references, most of which denote work published before 1979. Differences between opinions of prominent researchers and lack of substantive data are duly noted where necessary by the author.

The reviewer would have appreciated expanded coverage of the topic of proportioning concrete mixtures containing fly ash. The author does refer to a proportioning procedure for fly ash concrete recommended by the American Concrete Institute (ACI) and lists additional references that will at least partially satisfy those who wish to pursue the topic in more detail. Unique and noteworthy in the book are summaries of tests of the composition of fresh concrete by both nuclear and nonnuclear methods. Unfortunately, some recent advances in the areas are not found in the text. However, the author has performed a valuable service by condensing and presenting a large body of important information on tests for determining cement and water contents of fresh concrete in a straight-forward and readily understood fashion. Less noteworthy and at times distracting aspects of the book are detailed developments of relationships between numerous variables. Clearly, a major purpose of the book was to illustrate and document relationship and formula development. In the judgement of the reviewer, however, reduced emphasis on details of the developments would have made portions of the book less tedious to follow and use. In addition, the purposes of at least some of the relationships, once developed, were not always evident. Clarity would have been served had the author focused more on utility of the relationships and less on the developments.

The perceptions of the reviewer were not uniformly enthusiastic regarding style, detail, form of presentation, and, to a minor extent, coverage of some of the topics presented in the book. Nonetheless, Professor Popovics' latest work is a valuable reference source that contains very relevant and useful information for students, researchers, and concrete technology practitioners alike. The reviewer hopes that a companion volume on hardened concrete is in the offing.