Review of *Engineering Design*, by Rudolph J. Eggert

Pearson Education, Inc., Upper Saddle River, N.J., 2005; 394 pp. Price: $82.67.

Darrell G. Fontane
Professor of Civil Engineering, Colorado State Univ., Fort Collins, CO 80523.

One of the more difficult tasks in engineering education is to effectively teach the concept of "design." The design process is very broad and involves a wide range of activities, from abstract thinking to detailed modeling and calculations. In *Engineering Design,* author Rudolph J. Eggert presents a well-structured and thorough overview of engineering design concepts and methods. A major strength of this book is the presentation of the overall design process, the illustration of the systematic concepts that are involved in every phase of design, and definitions of the terms that are used in design. The author has experience with various organizations, including General Electric, Fisher-Price Toys, Wurlitzer, and the New York State Energy and Development Authority, and that experience with the design process no doubt contributed to the effective organization of this text.

The author states that this is a text for undergraduate or first-year graduate engineering students. He also states that the book has a focus of integrating engineering design with topics about the business of manufacturing. This reviewer teaches civil engineering. In my opinion this textbook might be particularly appropriate for use in senior-level capstone design courses. It is my observation that engineering educators are very good at teaching the science of design. By this I mean they are good at making appropriate engineering calculations once a design concept has been established. However, the more abstract processes of design, such as developing an initial design concept or working with customers, are not as easy to teach. The strength of this textbook is its presentation of a coherent structure for understanding the more abstract processes.

In this book Rudolph Eggert provides a systematic description for every phase of the design process. Chapter 3 gives an example of the design of a motorcycle that clearly illustrates the steps involved in developing design concepts. Other examples in the text also use items that students can relate to, including the design of a coffee pot and the manufacturing of bicycles. The discussion of customer satisfaction curves, in Chapters 3 and 8, is particularly useful in terms of providing the basis for the concepts of performance functions and ultimately multicriteria decision analysis techniques. These tools provide a basis for both guiding decisions as well as documenting decisions made during the design process. Chapter 10 covers topics of design failure, safety, and environment that it is crucial to present to engineering students. Finally, Chapter 14 on Projects, Teamwork, and Ethics has some very useful material.

While I believe that this would be a textbook strongly worth considering for an engineering capstone design course, as a civil engineer I would have liked some detailed examples of design that relate to large, one-of-a-kind projects. While the material presented is applicable to any engineering discipline, the design and construction of large projects have unique characteristics. The examples presented in this book do not address these unique characteristics. For example, civil engineers certainly have customers similar to the examples presented for the designer of a bicycle or coffee pot. However, a major difference is that civil engineers cannot usually design a working prototype of a large project, such as a major structure, to be tested by the user. Another crucial issue for civil engineers is the potential large-scale safety and environmental impacts that could result from the failure of a major project.

Review of *Fluvial, Environmental and Coastal Developments in Hydraulic Engineering* edited by M. Mossa, Y. Yasuda, and H. Chanson

2004, A. A. Balkema, Taylor and Francis Group, The Netherlands, ISBN 04-1535-899-X; 235 pp. Price: $119.

Pierre Y. Julien
Engineering Research Center, Colorado State Univ., Fort Collins, CO 80523. E-mail: pierre@engr.colostate.edu

This book contains the Proceedings of the International Workshop on State-of-the-Art Hydraulic Engineering. The workshop was held February 16–19, 2004, at the LIC, Coastal Engineering Laboratory of the Technical University of Bari, Italy. The four main themes of the workshop were (1) behavior of air-water flows, (2) stepped spillways, (3) environmental and coastal hydraulics, and (4) transition flows. Perhaps transition flows could be better defined, particularly since three of the four section headings include the wording "transitional flows." Each section contains 2–4 expanded lectures on those subjects. Laboratory and prototype investigations show the complexity of free-surface aeration processes. A basic dimensional analysis aims at filling the gap between gas-liquid flow expertise and traditional hydraulic engineering. New experiments on stepped spillways are presented in the book. The energy loss of skimming flows is clarified, and the changes in energy loss with dam height and step height are discussed. Furthermore, the authors propose an analysis of air-water flow structures and interactions between free-surface and cavity recirculation. The results are discussed in the context of overflow embankment stepped spillway design.

In terms of environmental and coastal hydraulics, the book presents results of wastewater ocean outfall, jet-current interactions, and jet-wave interactions. Other chapters include an analysis of tidal bores and fishway design in a slit-type Sabo dam.

The authors were successful at completing the proceedings of this workshop within a relatively short period of time. There are only eight authors to this workshop, and the presentations are at the level of refereed conference papers. The topics are so varied that it is very difficult to define the thread linking these topics altogether.

Readers purchasing this book solely from its title risk disappointment. The title is misleading, because the reader can hardly find applications to rivers and fluvial systems. The word "coastal" in the title also seems questionable since only 50 pages refer to waves and coastal basins. It is difficult to suggest a better title, but there are about 150 pages of material concerning aeration and stepped spillways, and this seems to be the primary contribution of the book. Perhaps the title could have included key words like aeration, air entrainment, or perhaps diffusion. However, readers interested in those topics may find similar material from the same authors in other books. The fact remains that it is hard to pinpoint the primary theme of this book.

The appealing aspect of this book is that it contains a broad spectrum of information, including dimensional analysis, laboratory experiments and results, recent developments in laboratory turbulence/aeration measurements, 3D computer model applications and field measurements to the Gulf of Taranto in Italy, field applications to Sabo Dams, river estuaries and environmental considerations for aquatic species. This breadth of information is quite eclectic. It is nevertheless very difficult for the reader to find a way to stay focused on such a variety of topics. This book should appeal to scientists and experts interested in stepped spillways, air entrainment, and coastal basins.

The book is generously illustrated with a variety of black and white photographs, and numerous graphs with laboratory and field measurements. Each lecture is self-contained with its own figure and table numbering, references, and equation number. Slight inconsistencies in the presentation are noticeable with, for instance, capitalized references and boldfaced equations in the first section. The typesetting seems more standard in the following three sections. The publisher provides a high-quality binding that will last forever. At 50 cents per page, the price is certainly high for this relatively small volume, but those who attended the workshop will certainly appreciate having all this material available in a single document.

In summary, this book's title may be misleading and the potential buyer should first check the table of contents. The strength of the book lies in the high-quality proceedings of this international workshop. It should be of primary interest to scientists and experts in the field of air entrainment, stepped spillways, and coastal basins. On the other hand, it is difficult to assess the unique and well-focused contribution of this set of workshop lectures. The price may also be high for readers interested only in a small portion of its content.