Albright's Chemical Engineering Handbook

By Lyle F. Albright, CRC Press, Boca Raton, FL. 2008, 1909 pp., $198.50.

If the measure of a good novel is how fast you read it because it is so engaging, then the measure of a good technical book is how long it stays on your desk because it is so useful. To the extent that this is a truism, then "Albright's Chemical Engineering Handbook" is a very good technical book. It has hardly left my desk since I received it. As a process development, design and operations engineer I have recently been involved in a wide variety of solids preparation and handling. This required new knowledge in areas such as crystallization, slurry-handling, centrifugation, filtering, and drying. I have relied heavily on this book for designing the process, selecting equipment, and operating that equipment. With greater use came a growing recognition of the sheer quantity of information included and an appreciation of the clarity of its presentation. This is a book designed first and foremost with the functioning engineer in mind.

The book is organized in a somewhat conventional way growing from the engineering fundamentals, through chemical operations into applied topics for the practicing engineer. The early chapters (1 to 4) cover property estimation, mathematics, statistical methods and thermodynamics. These are structured as an overview refresher with a utilitarian emphasis. The middle chapters (5 to 14) tackle the essential chemical engineering topics roughly following a unit operation format. In quick succession the topics of fluid flow, heat transfer, mass transfer, mixing, extraction, reaction engineering, distillation and absorption/adsorption are addressed. Each of these chapters is structured around a succinct explanation of the fundamental theory then a more thorough description of application and design. The later chapters (15 to 26) address applications such as process control, safety, environmental, an extensive list of heuristic design and operating rules, solids handling and electrochemistry. The final chapters (27 to 29) provide useful information for any working engineer regarding intellectual property, guidelines on communication and the, not insignificant issue, of engineering ethics.

Dr. Albright selected a distinguished group of contributors, each of whom is an expert in their specific field and responsible for each of the topical chapters. What makes the book work so well is the continuity in both structure and style of each chapter which is undoubtedly due to his careful editing. Each chapter flows logically and smoothly with a consistent focus on utility to a working engineer. More importantly there is cohesiveness between each chapter that makes the book feel as although written completely by a single author. In addition, as you would expect in a handbook, critical design information is often provided (e.g., a table of tubing sizes in the fluid flow section, packing characteristics in the distillation section, power and flow numbers for different impellors in the mixing section), but not to the extent that the book seems overly cluttered.

By far the most valuable chapter to a working engineer is chapter 16 entitled "Conceptual Process Design, Process Improvement and Troubleshooting." This single chapter could easily be a book unto itself. The first part of this chapter shares methods and structure for project analysis. Emphasis is less on economic methods, which are well known to most engineers, but more on issues of sustainability, safety, waste minimization and environmental considerations. Modeling and equation-based approaches are briefly introduced. Of much greater use is the latter part of this chapter which provides an exhaustive list of "rules-of-thumb" for designing just about anything one could imagine. How much air leakage is reasonable for a vacuum pump? About 50 kg/h. What is a reasonable tube velocity in a liquid heat exchanger, 1 to 1.5 m/s. What is a reasonable heat-transfer coefficient in a solid flaker? 0.35 $kW/m^{3\circ}$ C. What are the reasonable water loading for vacuum drying crystals/ 0.13–0.27 g water/s m^2. This goes on for about 90 pages of densely packed topics. Having this type of information in a single location is of extraordinary value.

The book is not without its weaknesses but they are minor. For example, the theory provided is condensed to that which is needed for either quick estimation of performance or for differentiating between various design approaches. Further detail is directed to the references which are extensive. Recent examples in my experience started with Albright then led nicely for a deeper analysis of reaction engineering into Fogler's book (*Elements of Reaction Engineering*) and a more thorough study of thermodynamics into Sandler's book (*Chemical and Engineering Thermodynamics*). Although both are my favorites and listed as references by Albright there are many more books, journals and, especially, online resources. Online resources are provided in large quantity; however, based on a random check, an occasional one is no longer active. This is undoubtedly due to the fluid nature of the internet but is more than offset by the quantity of alternatives.

In summary, I am an unabashedly enthusiastic fan of this book. I use it as a first reference to understanding problems with existing equipment. It has also proven valuable to me in process design, selecting and sizing equipment, starting and operating that equipment at pilot plant scale and then scaling that to commercial operation. It is the first place I go for information and would be a worthy addition to any engineer's bookshelf or, more likely, the corner of their desk.

Cliff P. Kowall
4502 Liberty Rd,
South Euclid,
OH 44121
E-mail: cpkowall@roadrunner.com

AIChE Journal, Vol. 56, 3025 (2010)

DOI 10.1002/aic.12353
Published online August 31, 2010 in Wiley Online Library (wileyonlinelibrary.com)