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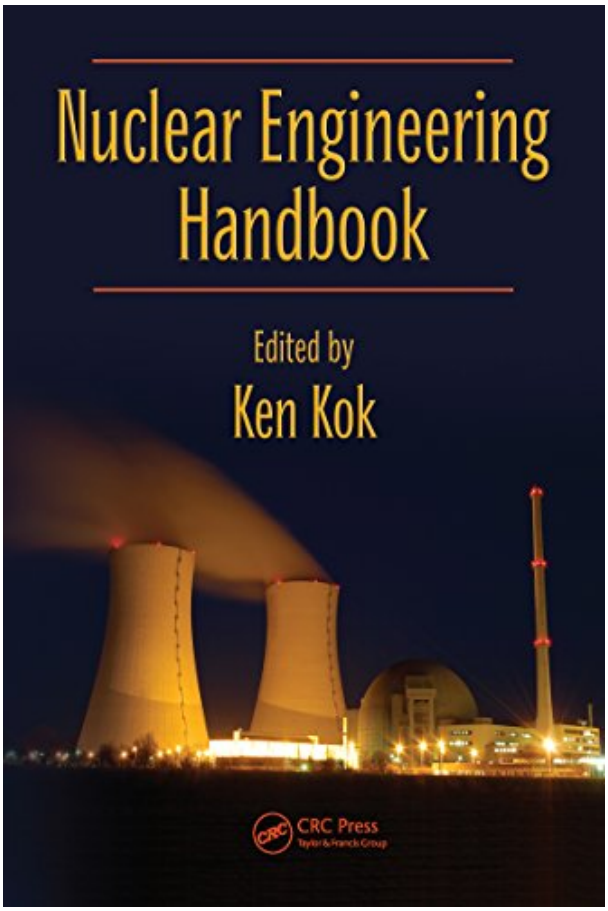

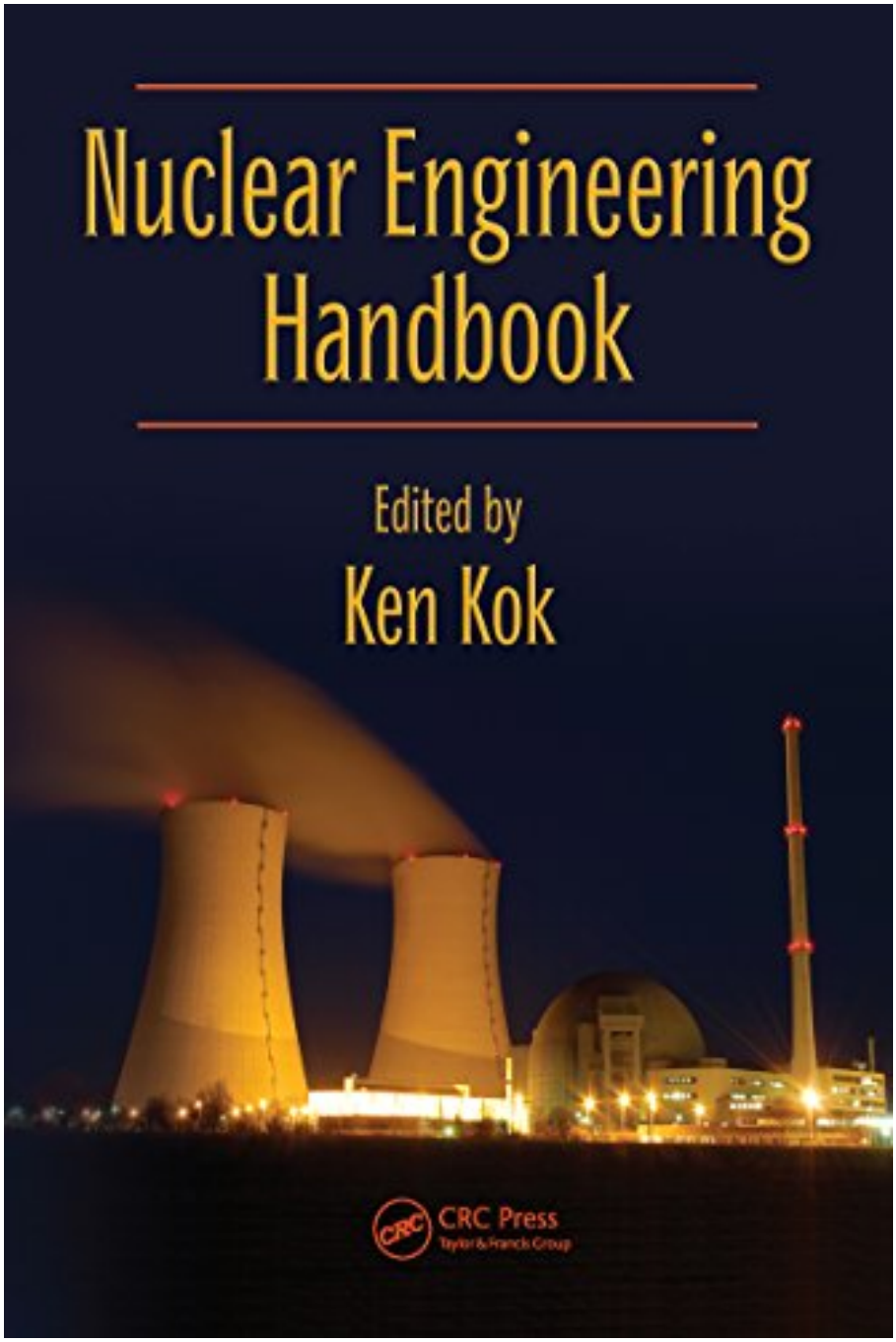

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About the Author

Kenneth D. Kok, P.E., has had 40 years of varied experience in the nuclear industry. He is currently a Fellow Engineer with WSMS Mid-America in Oak Ridge, Tennessee, providing support for the WSMS Clients group as a nuclear safety engineer and an independent technical reviewer. Kok has served as the chair of the ASME Nuclear Engineering Division, directed the ASME course related to D&D, and supported the ICEM and ICONE meetings as a track leader and session chair. He has also seved as the Co-Chair of ICEM.

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Nuclear power has, in recent years, undergone a major transformation, resulting in major technical developments and a new generation of nuclear scientists and engineers. A comprehensive book that reflects the latest nuclear technologies has been lacking—until now.

The Nuclear Engineering Handbook is a response to this global resurgence of interest in commercial nuclear power. A broad overview of nuclear power and engineering and their limitless potential, this basic introduction to the field provides an in-depth discussion of power plants and extensive coverage of the nuclear fuel cycle, waste disposal, and related engineering technologies.

Organized into three sections—Nuclear Power Reactors, Nuclear Fuel Cycle Processes and Facilities, and Engineering and Analytical Applications—this book addresses the entire nuclear fuel cycle and process. Topics include everything from the mining, milling, and enrichment of uranium and thorium fuel resources, to fuel fabrication, nuclear materials transportation, fuel reprocessing, and safe waste disposal. This all-encompassing volume discusses current analytical techniques related to nuclear engineering, addressing safety, heat transfer, shielding, thermo-hydraulics, and heat physics. Covering reactor operation and radiation protection, it also outlines the economic considerations involved in building new nuclear power stations instead of large fossil-fueled plants, and elaborates on concerns regarding the control of emissions from the latter.

A review of past and current nuclear engineering capabilities, this valuable resource covers the gamut of crucial topics, including historical perspectives, a detailed technological review, and an assessment of the field’s future direction. It is an exceptional tool that will help readers to foster optimal understanding and use of nuclear power for electricity generation now and in the future.

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3 of 4 people found the following review helpful.
Trees, not forest, and badly edited
By A. J. Sutter
This book claims to be addressed not only to engineers and engineering students and teachers, but to "science and technology journalists and interested members of the general public" (@ix). If you're within that quoted bit, however, you're likely to find the book quite frustrating to use, whatever your opinions about nuclear power. (Needless to say, all the contributors are fans.) In fact, I imagine quite a few professionals might get annoyed by it as well.

The editor seems to have conceived his job simply as a traffic coordinator for assembling the chapters and writing brief section introductions (as well as contributing a chapter of his own). However, the contents are desperately in need of editorial attention. Often acronyms are used before they are defined, and occasionally without definition at all (e.g. in Section I, about reactor types). Neither the book as a whole not any individual chapter includes a list of acronyms, and while a few can be puzzled out by scanning the rather inadequate index (e.g., PXS -- though you'll have to look under letter 'A' to find it), some (such as ADS) are neither indexed nor defined within the pertinent chapter.

The writing style is about as exciting as you might expect from engineers -- long paragraphs, mostly in the passive voice. It's often repetitious; e.g., we're told twice within five pages that U-238's half-life is the same as the age of the earth, and twice on facing pages that uraninite is the main primary uranium ore mineral (Chap. 7). The prose is especially deadly in Section I. The day I started reading this book I drank not only an espresso but a pot of tea, and I still had trouble staying awake. Really. Perhaps an editor can't be expected to turn contributors into terrific writers, but he might be expected to flag self-contradicting monstrosities like this: "[T]he normal -- mass 1 atom, often called 'protium' -- hydrogen in light water is more effective in reducing the energy of neutrons than is the heavier deuterium atom -- the stable, mass 2 form of hydrogen -- but it [sic] has a far lower propensity to absorb neutrons than protium." (@142-143). By the way, **five authors** as well as the editor thought that sentence was OK.

As for the contents, there is a heavy emphasis on nuts and bolts in the most literal sense -- as well as on flanges, impellers, and other mechanical engineering components. There are numerous illustrations of particular subsystems (e.g. steam generators, reactor cooling pumps, etc.) but the verbal descriptions often are far more detailed than one can follow from the illustrations themselves. Other illustrations, such as systems diagrams for hydraulic flows, are geared specifically for engineers and will be less legible to the purported general audience. For the most part, the book is written from a US point of view, though a couple of chapters (4 and 15, on heavy water reactors and their fuel cycle) have a more Canadian spin. British units

(pounds, inches, etc.) are used primarily, and sometimes exclusively. Nonetheless, the discussion is mostly qualitative -- equations are relegated to a couple of chapters near the end of the book on neutronics and heat transfer/thermal hydraulics.

A lot is missing from the book. For one, a disinterested comparison of the pros and cons of different reactor types. A retired guy from Westinghouse wrote about his company's pressurized water reactors (PWRs), a guy from GE wrote about his company's boiling water reactors (BWRs), five Canadians wrote about the CANDU heavy-water reactor (HWR), etc. The Canadians especially were good about explaining what they think are the advantages of their design, but no one talks about the drawbacks, or more generally how a particular reactor type is well-suited for a particular situation. Nor is there even an explanation for why PWRs are the most popular design currently. Also missing is much sense of the evolution of reactors. Especially for BWRs and PBRs the emphasis is on the latest and greatest versions, and on the types immediately preceding. If you'd like to know about the 1970s-vintage BWRs that melted through in Fukushima, you will only be able to glean the most general information, and that with some difficulty. The impact of control-room design is another absentee. A table in the BWR chapter distinguishes between system-based and operator task-based control room design, but the benefits of one or the other, to say nothing of human factors generally, are never discussed, in any chapter.

As one might expect, the environmental and other downsides of nuclear power aren't treated in depth. The chapter on mining has this to say about ISL operations (the acronym isn't defined in the book, BTW, though we're told it's also known as "solution mining"): "With ISL operations, the orebody stays in the ground and uranium is recovered by circulating oxygenated and acidified groundwater through it, using injection and recovery wells. The main environmental consideration with ISL is avoiding pollution of groundwater away from the orebody, and leaving the immediate groundwater no less useful than it was initially." Period. Just enough to get you scared, perhaps, because the book is silent on how those environmental goals are accomplished (or not). In the final chapter, on economics of nuclear power, all environmental impacts are externalized -- i.e., ignored. Forget about any mention of the greenhouse gas budget of the nuclear power cycle (construction of plant, fuel cycle, operations, decommissioning, waste storage and treatment, etc.) The author even asserts that *health benefits* of low-level radiation exposure (no citation is offered) will result in relaxed regulations, leading to even greater cost advantages for nuclear power. I might hope the lessons of Fukushima, which also include significant logistical and reputational economic impacts as well as environmental ones, will be reflected in a future edition; though since even Chernobyl is barely mentioned in the book, it would no doubt be an unfulfilled hope.

As would be a hope for some "solution mining" technique to help one get the useful information from this book without much time and trouble. There's certainly a lot of useful information in it. But be warned that it is not disinterested, not big-picture, and not easy to dig out.

2 of 7 people found the following review helpful.
Premature
By Frank A. Stephenson
Amazon has asked me to review the Nuclear Engineering Handbook which I purchased less than three weeks ago. This book is hundreds of page of highly technical information. What's wrong with this picture? It will take me the better part of year to decide how useful it will be and whether I am better off having it or not. That's what's wrong.

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