
PREFACE

When I was a young boy in school, I longed to be a doctor but fate deemed otherwise and I ended up becoming a chemical engineer. Now chemical engineering, like all other fields, is a very vast field but I ended up in the very narrow specialization of thermal design of shell-and-tube and air-cooled heat exchangers. I must confess that after eight to ten years of this activity, my soul yearned for a change and I sought to diversify into the world of fired heaters. However, for various reasons, this did not materialize and I continue to rove the world of unfired heat transfer. After a period of another five years, I found my interest in heat exchangers rekindled, thanks to the wonderful exposition of this technology by HTRI (Heat Transfer Research, Inc.). Pinch technology came of age around that time and proved to be a perfect foil and adjunct to heat exchanger thermal design.

I have always been inspired by these words of George Eliot: “What do we live for if not to make the world less difficult for each other?” Buoyed by a positive frame of mind, I thought that it might be a good idea to share some of the things that I had learned with readers across the world and started writing an odd paper or two for journals such as *Chemical Engineering Progress* and *Hydrocarbon Processing*. A major accident left me severely handicapped and curtailed my mobility drastically. This proved to be a blessing in disguise as far as my literary prowess was concerned. With a lot of time on my hands and a PC at home, I wrote a few comprehensive papers for *Chemical Engineering Progress* and *Hydrocarbon Processing* and received some very appreciative and heartening feedback. This gave me the confidence that I could now write a full-fledged book, an idea that Ms. Cynthia Mascone, presently Technical Editor at *Chemical Engineering Progress*, supported keenly.

My desire to write this book was precipitated by the absence of such a book. Recent heat exchanger design literature has been predominantly occupied by proceedings of conferences. There is no book on the market that explains the logic of heat exchanger thermal design and gives practical suggestions, recommendations, and real-life case studies for actually designing industrial heat exchangers. So I decided to write just such a book.

The theoretical aspects of single-phase heat transfer, condensation, and vaporization have been presented very well in several books. So what was really required was a practical “how to design” book with numerous worked-out examples or case studies to embellish or illustrate a particular technique, facet, or style of design. The thousands of heat exchanger designs that I have been associated with over the last 33 years provided numerous such opportunities. They say that one picture is more eloquent than a thousand words. If you extend this logic, one appropriate illustration by a case study is more eminently didactic than a long dissertation on a particular subject as a case study leaves nothing to the imagination.

Throughout the book, therefore, carefully-chosen examples are presented at strategic locations so that the reader will have a clear understanding of the subject matter being discussed.

While working with HTRI software, I have always tried to observe the interplay of parameters and a basic understanding of cause and effect. I have also always attempted to understand why things happen the way they do. For example, why do viscous liquids behave so poorly inside tubes? Why does putting shells in series reduce the penalty due to temperature profile distortion? Why is flow-induced vibration really a pressure drop problem? And so on. While working on designs, I have always asked myself, “Isn’t there a better way of doing this?” Such an attitude has helped immensely in improving the quality of the designs and I exhort all designers to adopt a similar attitude.

This book has therefore been written primarily for the heat exchanger thermal designer. But I am confident that it will be useful to process engineers as well, a significant part of whose routine job is to specify heat exchangers. Since operating aspects are also often discussed, I trust it will be of interest to plant operation specialists as well.

Last but not least, it is my fond hope that even undergraduate chemical and mechanical engineering students will find it interesting, informative, and useful. I still remember that when I was an undergraduate student, I used to long for more practical, real-life information about industrial practice. If one considers that many engineering graduates end up working in the chemical process industries, there may be a lot of merit in adding such a flavor to heat transfer in the university curriculum, as indeed it is to all other fields of human learning. The juxtaposition of industrial equipment design practice with basic theory will go a long way in making the subject more meaningful.

Being the first book I have written, there is bound to be significant scope for improvement. I will be very grateful to anyone offering positive guidance on shortcomings as well as inaccuracies.

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