
PREFACE

My desire to write this book was precipitated by the absence of such a “practical” book. Recent heat exchanger design literature has been predominantly occupied by proceedings of conferences. There is no book in the market that explains the logic of heat exchanger thermal design and gives practical suggestions and recommendations for actually designing industrial heat exchangers. So, having written my earlier book, *Practical Thermal Design of Shell-and-Tube Heat Exchangers*, which received a fairly good response, I decided to write a sequel—one on air-cooled heat exchangers.

The theoretical aspects of single-phase heat transfer and condensation have been very well presented 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 air-cooled heat exchanger designs that I have been associated with over the last three decades have provided numerous examples. 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 eminently more didactic than a long dissertation on a particular subject.

This book has been written in the same style, language, and format as the one on shell-and-tube heat exchangers. For the sake of convenience, both English and metric units have been used throughout the book. There are 26 case studies, all aimed at embellishing, illustrating, reinforcing, or demonstrating a feature, rationale, or methodology of design elaborated or advocated in the text. Not only are the case studies based on the HTRI software, the entire book is founded on the platform of HTRI know-how, which has become a way of life for me for almost three decades.

Being a “practical” book, theory is limited to a bare minimum, and the accent is on fundamentals, on design logic, on the interplay of parameters, on cause and effect, on understanding why things happen the way they do. For example, why does a light hydrocarbon condenser tend to have only four rows of tubes, whereas a heavy hydrocarbon liquid cooler tends to have more rows of tubes? Or why do we choose 1/2 in. (12.7 mm) high fins in certain situations but 5/8 in. (15.875 mm) high fins in others? Or why is the process fluid “break point” between an air-cooled heat exchanger and its downstream trim cooler related to the design ambient temperature? And many, many others.

This book has been written primarily for the heat exchanger thermal designer. However, I think it will also be useful to process engineers, a significant part of whose routine job is to specify heat exchangers. This book has not been written in an esoteric style for this very reason. Since operating aspects are also often discussed, I trust it will be of interest to plant operation specialists as well.

It is my fond hope that even B.S. and M.S. chemical and mechanical engineering

students will find the book interesting, informative, and useful. I still remember 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 interesting and meaningful.

The thermal design of air-cooled heat exchangers is a fascinating activity—sometimes even more so than that of shell-and-tube heat exchangers—for the simple reason that there are more variables: even the coolant (air) flow rate is a variable! This book will have served its purpose if it can inspire the reader to consider the thermal design of air-cooled heat exchangers as a joyous activity rather than a mundane chore.

I will be grateful for any feedback regarding any aspect of this book, and the same may be sent to rajiv.mukherjee@vsnl.com or rajivmuk2003@yahoo.com.

R. Mukherjee
Heat Transfer Consultant
New Delhi, India