

## **PREFACE**

Jerry Taborek, the founding Technical Director of Heat Transfer Research Inc. (HTRI), used to say 'Computer programs do not design heat exchangers - engineers do'. Although I agree totally with the sentiment behind Jerry's statement, it has been my experience that on too many occasions, engineers have left the design of equipment almost completely to the computer programs, and forgotten that they, the engineers, have ultimate responsibility.

It is true that since Jerry made his statement, the sophistication of heat exchanger design software has increased dramatically, and modern codes attempt to be 'expert systems' which can advise the designer. None the less, the best designs are produced by those who understand what they are doing, and the limitations of the programs they are using, rather than by those who use the programs as magic 'black boxes'. This book is designed to help the engineer in this task.

The book is concerned with the Thermal design process, not Mechanical design. Although comments are made throughout the book on matters of a mechanical nature, and Chapter 7 contains a section on how mechanical constraints influence the thermal design process, the information given is for guidance only. The final design must be checked for compliance with the appropriate mechanical design code by a competent mechanical engineer.

## **SOURCES FOR THE BOOK**

In the early 1990's, The Process Engineering Committee of Imperial Chemical Industries PLC (ICI) decided that it would be of benefit to the company if much of the accumulated practical knowledge of the many process specialists scattered around the Group were codified into a form which would be readily available to the general practising process engineer. Accordingly, a series of 'Process Engineering Guides' was written. As the senior internal consultant in heat transfer, it fell to my lot to write most of the Guides in the Heat Transfer series. This book is based on those Guides, although it has been supplemented with other material, and the arrangement of the information restructured.

It was never the intention that the ICI Guides would replace standard textbooks. The emphasis was more on practical applications than on the theory. This approach has been carried over into this book, and is reflected in its title. Readers will not find much detailed heat transfer theory here. Indeed, it is in general assumed that they already have a reasonable understanding of the theory. If not, they are referred to one of the many excellent text books on heat transfer, or back to their university notes! In any case, the better computer codes for exchanger rating incorporate the best methods. The aim of the book is rather to give guidance on those aspects of heat transfer which are often not covered in university heat transfer courses, but which practical experience suggests are important.

## **ACKNOWLEDGEMENTS**

A book of this nature, based as it is on accumulated practical experience, can never claim to be the work of one man. Those to whom I am indebted are too numerous for me to name them all.

My general education in practical heat transfer owes much to technical discussions, both formal and informal, held with both staff and sponsors of the two major heat transfer research organisations with which ICI has been associated over the years, HTRI and HTFS, although I believe that I have not included in this book any proprietary information obtained in this manner without permission.

Among my colleagues within ICI, I wish particularly to acknowledge the help and support over the years of my two predecessors as principal internal heat transfer consultant: Bob Smith and Geoffrey Walter; the members of the ICI Heat Transfer Panel who provided both material and constructive criticism during the writing of the ICI Guides: David Bate, Ian Buckley, Reg Crane, Peter Farnell, Richard Fawcett, Peter Gowland, Neil McNaughton and Neil Turner; and the chairman of the ICI Water Treatment Panel, Rob Terrell.

The ICI Guide on Air Cooled Heat Exchangers, on which Chapter 8 of this book is based, made extensive use of a report written for ICI by C.M.B. Russell, formerly of Lummus Heat Transfer.

I am grateful to those companies and organisations which have supplied me with, or given permission to use, the various illustrations in this book. I trust that they find any comments I have made on their products to be accurate and fair.

Finally, as stated above, this book is based on internal ICI reports, and I am grateful to ICI for permission to publish.

## **DISCLAIMER**

Although this book makes extensive use of the internal ICI guides mentioned above, the views expressed in the book are my personal opinions, given in good faith, and are not necessarily those of the company. Imperial Chemical Industries PLC do not accept any responsibility for the contents of the book nor for the consequences of any actions based on the advice given in it.

Within this book I mention by name several companies and research organisations. In so doing, I hope that I am providing accurate factual information, but no specific endorsement of any company or product is intended. Equally, failure to mention other companies producing material similar in nature to those mentioned is not intended in any way as a criticism of such companies. New companies appear from time to time, and existing ones either cease trading or are subject to take-over. Equipment and software are continuously being developed, and specifications change, and even were I to mention all suppliers and equipment, the list would rapidly become out of date.