Heat Exchanger Design Handbook Second Edition

The proposed is written as a senior undergraduate or the first-year

graduate textbook,covering modern thermal devices such as heat sinks, thermoelectric generators and coolers, heat pipes, and heat exchangers as design components in larger systems. These devices are becoming increasingly important and fundamental in thermal design across

such diverse areas as microelectronic cooling, green or thermal energy conversion, and thermal control and management in space, etc. However, there is no textbook available covering this range of topics. The proposed book may be used as a capstone design course after the

fundamental courses such as thermodynamics, fluid mechanics, and heat transfer. The underlying concepts in this book cover the, 1) understanding of the physical mechanisms of the thermal devices with the essential formulas and detailed derivations, and 2) designing

the thermal devices in conjunction with mathematical modeling, graphical optimization, and occasionally computational-fluid-dynamic (CFD) simulation. Important design examples are developed using the commercial software, MathCAD, which allows the students to easily

reach the graphical solutions even with highly detailed processes. In other words, the design concept is embodied through the example problems. The graphical presentation generally provides designers or students with the rich and flexible solutions toward achieving the

optimal design. A solutions manual will be provided.
This book presents contributions from renowned experts addressing research and development related to the two important areas of heat exchangers, which are advanced features and applications. This book

is intended to be a useful source of information for researchers, postgraduate students, academics, and engineers working in the field of heat exchangers research and development.

This book introduces the fundamental concepts of inverse heat transfer

problems. It presents in detail the basic steps of four techniques of inverse heat transfer protocol, as a parameter estimation approach and as a function estimation approach. These techniques are then applied to the solution of the problems of practical engineering interest

involving conduction, convection, and radiation. The text also introduces a formulation based on generalized coordinates for the solution of inverse heat conduction problems in two-dimensional regions.

Design and Operation of heat Exchangers and Their Networks

presents a comprehensive and detailed analysis on the thermal design methods for the most common types of heat exchangers, with a focus on their networks, simulation procedures for their operations, and measurement of their thermal performances. The book addresses

the fundamental theories and principles of heat transfer performance of heat exchangers and their applications and then applies them to the use of modern computing technology. Topics discussed include cell methods for condensers and evaporators, dispersion models for

heat exchangers, experimental methods for the evaluation of heat exchanger performance, and thermal calculation algorithms for multi-stream heat exchangers and heat exchanger networks. Includes MATLAB codes to illustrate how the technologies and methods discussed

can be easily applied and developed. Analyses a range of different models, applications, and case studies in order to reveal more advanced solutions for industrial applications. Maintains a strong focus on the fundamental theories and principles of the heat transfer performance of

heat exchangers and their applications for complex flow arrangement.

This book presents the ideas and industrial concepts in compact heat exchanger technology that have been developed in the last 10 years or so. Historically, the development and

application of compact heat exchangers and their surfaces has taken place in a piecemeal fashion in a number of rather unrelated areas, principally those of the automotive and prime mover, aerospace, cryogenic and refrigeration sectors. Much detailed technology, familiar in

one sector, progressed only slowly over the boundary into another sector. This compartmentalisation was a feature both of the user industries themselves, and also of the supplier, or manufacturing industries. These barriers are now breaking down, with valuable cross-fertilisation

taking place. One of the industrial sectors that is waking up to the challenges of compact heat exchangers is that broadly defined as the process sector. If there is a bias in the book, it is towards this sector. Here, in many cases, the technical challenges are severe, since high

pressures and temperatures are often involved, and working fluids can be corrosive, reactive or toxic. The opportunities, however, are correspondingly high, since compacts can offer a combination of lower capital or installed cost, lower temperature differences (and hence

running costs), and lower inventory. In some cases they give the opportunity for a radical re-think of the process design, by the introduction of process intensification (PI) concepts such as combining process elements in one unit. An example of this is reaction and heat

exchange, which offers, among other advantages, significantly lower by-product production. To stimulate future research, the author includes coverage of hitherto neglected approaches, such as that of the Second Law (of Thermodynamics), pioneered by Bejan and co- workers.

The justification for this is that there is increasing interest in life-cycle and sustainable approaches to industrial activity as a whole, often involving exergy (Second Law) analysis. Heat exchangers, being fundamental components of energy and process systems, are both savers and

spenders of exergy, according to interpretation.
This classic text is an exploration of the practical aspects of thermodynamics and heat transfer. It was designed for daily use and reference for system design and for troubleshooting common engineering

problems-an indispensable resource for practicing process engineers. "This comprehensive reference covers all the important aspects of heat exchangers (HEs): design and modes of operation and practical, large-scale applications in process, power, petroleum, transport, air

conditioning, refrigeration, cryogenics, heat recovery, energy, and other industries. It includes over 400 drawings, diagrams, tables, and equations, making it a great resource for mechanical, chemical, and petrochemical engineers; process equipment and pressure vessel

designers; and upper-level undergraduate and graduate students. This second edition includes updated material throughout; coverage of the latest advances in HE design techniques; expanded and updated coverage of materials selection; and a look at the newest

fabrication techniques"--
In the wake of energy crisis due to rapid growth of industries, the efficient heat transfer could play a vital role in energy saving. Industries, household equipment, transportation, offices, etc., all are dependent on heat exchanging equipment.

Considering this, the book has incorporated different chapters on heat transfer phenomena, analytical and experimental heat transfer investigations, heat transfer enhancement and applications.

Hemisphere Handbook of Heat Exchanger Design

Fundamentals of Heat Exchanger Design

Fundamentals and Applications

Thermal Design

Handbook for Transversely Finned Tube Heat Exchanger Design

Heat Exchanger Design Guide

A HEAT TRANSFER TEXTBOOK

Heat Exchanger Design Handbook
Selection, Design and Operation
Process Heat Transfer

Heat Exchanger Design Guide: A Practical Guide for Planning, Selecting and Designing of Shell and Tube Exchangers takes users on a step-by-step guide to the design of heat

exchangers in daily practice, showing how to determine the effective driving temperature difference for heat transfer. Users will learn how to calculate heat transfer coefficients for convective heat transfer, condensing, and evaporating using simple equations. Dew and bubble points and lines are

covered, with all calculations supported with examples. This practical guide is designed to help engineers solve typical problems they might encounter in their day-to-day work, and will also serve as a useful reference for students learning about the field. The book is extensively illustrated with figures in support of the

text and includes calculation examples to ensure users are fully equipped to select, design, and operate heat exchangers. Covers design method and practical correlations needed to design practical heat exchangers for process application Includes geometrical calculations for the tube and shell side,

also covering boiling and condensation heat transfer Explores heat transfer coefficients and temperature differences Designed to help engineers solve typical problems they might encounter in their day-to-day work, but also ideal as a useful reference for students learning about the field

Heat exchangers are a crucial part of aerospace, marine, cryogenic and refrigeration technology. These essays cover such topics as complicated flow arrangements, complex extended surfaces, two-phase flow and irreversibility in heat exchangers, and single-phase heat transfer.

Indeed, today "second generation" enhancement concepts are routing in the automotive and refrigeration industries to obtain lower cost, smaller heat exchanger size, and higher energy efficiency in system operation. And the aerospace, process, and power generation industries are not far

behind.

Researchers, practitioners, instructors, and students all welcomed the first edition of Heat Exchangers: Selection, Rating, and Thermal Design for gathering into one place the essence of the information they need-information formerly scattered throughout the

literature. While retaining the basic objectives and popular features of the bestselling fi

"This comprehensive reference covers all the important aspects of heat exchangers (HEs)--their design and modes of operation--and practical, large-scale applications in process, power,

petroleum, transport, air conditioning, refrigeration, cryogenics, heat recovery, energy, and other industries. Reflecting the author's extensive practical experienc

Completely revised and updated to reflect current advances in heat exchanger technology, Heat Exchanger

Design Handbook, Second Edition includes enhanced figures and thermal effectiveness charts, tables, new chapter, and additional topicsall while keeping the qualities that made the first edition a centerpiece of information for practicing engineers, research, engineers, academicians, designers, and

manufacturers involved in heat exchange between two or more fluids. See Whats New in the Second Edition: Updated information on pressure vessel codes, manufacturers association standards A new chapter on heat exchanger installation, operation, and maintenance practices Classification

chapter now includes coverage of scrapped surface-, graphite-, coil wound-, microscale-, and printed circuit heat exchangers Thorough revision of fabrication of shell and tube heat exchangers, heat transfer augmentation methods, fouling control concepts and inclusion of recent advances in PHEs

New topics like EMbaffle, Helixchanger, and Twistedtubeheat exchanger, feedwater heater, steam surface condenser, rotary regenerators for HVAC applications, CAB brazing and cupro-braze radiators Without proper heat exchanger design, efficiency of cooling/heating system of plants and

machineries, industrial processes and energy system can be compromised, and energy wasted. This thoroughly revised handbook offers comprehensive coverage of single-phase heat exchangersselection, thermal design, mechanical design, corrosion and fouling, FIV, material selection and

their fabrication issues, fabrication of heat exchangers, operation, and maintenance of heat exchangers all in one volume.

Each chapter begins with a brief yet complete presentation of the related topic. This is followed by a series of solved problems. The latter are

scrupulously detailed and complete the synthetic presentation given at the beginning of each chapter. There are about 50 solved problems, which are mostly original with gradual degree of complexity including those related to recent findings in convective heat transfer phenomena. Each problem is

associated with clear indications to help the reader to handle independently the solution. The book contains nine chapters including laminar external and internal flows, convective heat transfer in laminar wake flows, natural convection in confined and no-confined laminar flows, turbulent internal flows,

turbulent boundary layers, and free shear flows.

Heat exchangers are vital equipment in power producing plants; process and chemical industries; heating, ventilation, air-conditioning and refrigeration systems; and the cooling of electronics. This book focuses on

thermohydraulic design, design processes, rating, and operational problems of various types of heat exchangers. One of the main objectives of this text is to introduce thermal design by describing various types of single phase and two phase heat exchangers. -- Special attention to the

design of heat exchangers subject to fouling is presented -- An extensive appendix provides thermophysical properties of various fluids including the new refrigerants -- End of chapter worked examples illustrate thermal design methods and procedures -- End of chapter problems, including student

design projects, enhance design applications

Heat Transfer Calculations

A Festschrift for A.L. London

Advanced Features and Applications

Advances in Heat Exchangers

Heat Sinks, Thermoelectrics, Heat Pipes, Compact Heat Exchangers, and

Solar Cells

Principles of Enhanced Heat Transfer

Heat Transfer: Exercises

Kern's Process Heat Transfer

Turbomachinery Fluid Dynamics and Heat Transfer

Solved Problems

Handbook for

Transversely Finned Tubes Heat Exchangers Design contains detailed experimental data, correlations, and design methods for designing and improving the

performance of finned tube heat exchangers. It covers the three main types, circular finned, square finned, and helical finned tube bundles. Based on

extensive experimental studies and tested at leading design and research institutions, this handbook provides an extensive set of materials for

calculating and designing convective surfaces from transversely finned tubes, with a particular emphasis on power plant applications. Provides a

design manual for calculating heat transfer and aerodynamic resistance of convective heating surfaces fabricated in the form of tube bundles with

transverse circular, square and helical fins Presents calculations for finned surfaces operating under conditions of clean and dust-laden flows alike,

including finned convective heating surfaces of boilers Includes a fully solved exercise at the end of the book, illustrating the top-down approach

specially oriented to power plant heat exchangers Presenting contributions from renowned experts in the field, this book covers research and

development in fundamental areas of heat exchangers, which include: design and theoretical development, experiments, numerical modeling and

simulations. This book is intended to be a useful reference source and guide to researchers, postgraduate students, and engineers in the

fields of heat exchangers, cooling, and thermal management. Completely revised and updated to reflect current advances in heat exchanger technology,

Heat Exchanger Design Handbook, Second Edition includes enhanced figures and thermal effectiveness charts, tables, new chapter, and additional topics--all

while keeping the qualities that made the first edition a centerpiece of information for practicing engineers, research, engineers,

academicians, designers, and manufacturers involved in heat exchange between two or more fluids. See What's New in the Second Edition: Updated

information on pressure vessel codes, manufacturer's association standards A new chapter on heat exchanger installation, operation, and

maintenance practices Classification chapter now includes coverage of scrapped surface-, graphite-, coil wound-, microscale-, and printed circuit heat exchangers

Thorough revision of fabrication of shell and tube heat exchangers, heat transfer augmentation methods, fouling control concepts and inclusion of recent

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regenerators for HVAC applications, CAB brazing and cupro-braze radiators Without proper heat exchanger design, efficiency of cooling/heating system

of plants and machineries, industrial processes and energy system can be compromised, and energy wasted. This thoroughly revised handbook offers

comprehensive coverage of single-phase heat exchangers—selection, thermal design, mechanical design, corrosion and fouling, FIV, material selection

and their fabrication issues, fabrication of heat exchangers, operation, and maintenance of heat exchangers —all in one volume.

Heat exchangers are important devices for engineering, research, and industry. Because of this, any improvement helps to optimize the whole process.

Opportunity areas may be found in design, materials, or working fluids. In this sense, the present book compiles some advances in the matter of design

(three chapters) and working fluids (one chapter). An introductory chapter also is presented. Packed with laws, formulas, calculations

solutions, enhancement techniques and rules of thumb, this practical manual offers fast, accurate solutions to the heat transfer problems mechanical

engineers face everyday. Audience includes Power, Chemical, and HVAC Engineers Step-by-step procedures for solving specific problems such as heat exchanger design

and air-conditioning systems heat load

Tabular information for thermal properties of fluids, gaseous, and solids

This unique and

comprehensive text considers all aspects of heat exchanger fouling from the basic science of how surfaces become fouled to very practical ways of mitigating the

problem and from mathematical modelling of different fouling mechanisms to practical methods of heat exchanger cleaning. The problems that restrict

the efficient operation of equipment are described and the costs, some of them hidden costs, that are associated with the fouling of heat

exchangers are discussed. Some simple concepts and models of the fouling processes are presented as part of the introduction to the subject. Advice on the

selection, design, installation and commissioning of heat exchangers to minimise fouling is given. A large part of the text is devoted to the use of

chemical and other additives to reduce or eliminate the problem of fouling. Another large section is designed to give information on both on-line and off-line

cleaning of heat exchangers. One of the difficulties faced by designers and operators of heat exchangers is anticipating the likely extent of fouling

problems to be encountered with different flow streams. Another large section addresses the question and describes methods that have been used in

attempting to define fouling potential. The book concludes with a chapter on how fouling information can be obtained using plant data, field tests and

laboratory studies.
This Second Edition of the well-received work on design, construction, and operation of heat exchangers. Demonstrates how to apply theories of

fluid mechanics and heat transfer to practical problems posed by design, testing, and installation of heat exchangers. Tables and data have been brought

up to date, and there is new material on problems of vibration and fouling, and on optimization of energy use in the chemical process and

manufacturing industries. Covers all basic principles of heat exchanger design, and addresses many specialized situations encountered in

engineering applications.

This book insures the legacy of the original 1950 classic, Process Heat Transfer, by Donald Q. Kern. This second

edition book is divided into three parts: Fundamental Principles; Heat Exchangers; and Other Heat Transfer Equipment/ Considerations. - Part I

provides a series of chapters concerned with introductory topics that are required when solving heat transfer problems. This part of the book deals with

topics such as steady-state heat conduction, unsteady-state conduction, forced convection, free convection, and radiation. - Part II is

considered by the authors to be the “meat” of the book – addressing heat transfer equipment design procedures and applications. In addition to providing a

more meaningful treatment of the various types of heat exchangers, this part also examines the impact of entropy calculations on exchanger design. -

Part III of the book examines other related topics of interest, including boiling and condensation, refrigeration and cryogenics, boilers,

cooling towers and quenchers, batch and unsteady-state processes, health & safety and the accompanying topic of risk. An Appendix is

also included. What is new in the 2nd edition Changes that are addressed in the 2nd edition so that Kern’s original work continues to remain relevant in

21st century process engineering include: - Updated Heat Exchanger Design - Increased Number of Illustrative Examples - Energy Conservation/ Entropy

Considerations - Environmental Considerations - Health & Safety - Risk Assessment - Refrigeration and Cryogenics - Inclusion

of SI Units

Fouling of Heat Exchangers

Thermal-Hydraulic Fundamentals and Design; Advanced Study Book

Heat Exchanger Design Handbook, Second Edition

Design and Operation of Heat Exchangers and their Networks

From Fundamentals to Modern Industrial

Applications

Heat Transfer and Fluid Flow in Minichannels and Microchannels

Principles, Applications and Rules of Thumb

Heat Exchanger Design

A Practical Guide for Planning, Selecting and Designing of Shell and Tube Exchangers

Cutting-edge heat transfer principles and design applications Apply advanced

heat transfer concepts to your chemical, petrochemical, and refining equipment designs using the detailed information contained in this comprehensive volume. Filled with valuable graphs,

tables, and charts, Heat Transfer in Process Engineering covers the latest analytical and empirical methods for use with current industry software. Select heat transfer equipment, make

better use of design software, calculate heat transfer coefficients, troubleshoot your heat transfer process, and comply with design and construction standards. Heat Transfer in Process Engineering allows

you to: Review heat transfer principles with a direct focus on process equipment design Design, rate, and specify shell and tube, plate, and hairpin heat exchangers Design, rate, and specify air coolers with

plain or finned tubes
Design, rate, and specify different types of condensers with tube or shellside condensation for pure fluids or multicomponent mixtures
Understand the principles

and correlations of boiling heat transfer, with their limits on and applications to different types of reboiler design Apply correlations for fired heater ratings, for radiant and convective zones, and

calculate fuel efficiency
Obtain a set of useful Excel worksheets for process heat transfer calculations
The First Law of Thermodynamics states that energy can neither be created nor destroyed. Heat

exchangers are devices built for efficient heat transfer from one fluid to another. They are widely used in engineering processes and include examples such as intercoolers, preheaters, boilers and condensers in

power plants. Heat exchangers are becoming more and more important to manufacturers striving to control energy costs. Process Heat Transfer Rules of Thumb investigates the design and implementation of

industrial heat exchangers. It provides the background needed to understand and master the commercial software packages used by professional engineers for design and analysis of heat exchangers. This book

focuses on the types of heat exchangers most widely used by industry, namely shell-and-tube exchangers (including condensers, reboilers and vaporizers), air-cooled heat exchangers and double-pipe (hairpin)

exchangers. It provides a substantial introduction to the design of heat exchanger networks using pinch technology, the most efficient strategy used to achieve optimal recovery of heat in industrial

processes. Utilizes leading commercial software important to professional engineers designing heat exchangers Illustrates design procedures using complete step-by-step worked examples Provides details on

how to develop an initial configuration for a heat exchanger and how to systematically modify it to obtain a final design Abundant example problems solved manually and with the integration of computer

software

This didactic approach to the principles and modeling of mass transfer as it is needed in modern industrial processes is unique in combining a step-by-step introduction to all

important fundamentals with the most recent applications. Based upon the renowned author's successful new modeling method as used for the O-18 process, the exemplary exercises included in the text are fact-proven,

taken directly from existing chemical plants. Fascinating reading for chemists, graduate students, chemical and process engineers, as well as thermodynamics physicists.
Part I: Process design --

Introduction to design -- Process flowsheet development -- Utilities and energy efficient design -- Process simulation -- Instrumentation and process control -- Materials of construction -- Capital cost

estimating -- Estimating revenues and production costs -- Economic evaluation of projects -- Safety and loss prevention -- General site considerations -- Optimization in design -- Part II: Plant design --

Equipment selection, specification and design -- Design of pressure vessels -- Design of reactors and mixers -- Separation of fluids -- Separation columns (distillation, absorption and extraction) --

Specification and design of solids-handling equipment -- Heat transfer equipment -- Transport and storage of fluids.
Heat Exchanger Design Handbook, Second EditionCRC Press

Heat exchangers are essential in a wide range of engineering applications, including power plants, automobiles, airplanes, process and chemical industries, and heating, air conditioning and

refrigeration systems. Revised and updated with new problem sets and examples, Heat Exchangers: Selection, Rating, and Thermal Design, Third Edition presents a systematic treatment of the various types of heat

exchangers, focusing on selection, thermal-hydraulic design, and rating. Topics discussed include: Classification of heat exchangers according to different criteria Basic design methods for sizing

and rating of heat exchangers Single-phase forced convection correlations in channels Pressure drop and pumping power for heat exchangers and their piping circuit Design solutions for heat

exchangers subject to fouling Double-pipe heat exchanger design methods Correlations for the design of two-phase flow heat exchangers Thermal design methods and processes for shell-and-tube, compact, and

gasketed-plate heat exchangers Thermal design of condensers and evaporators This third edition contains two new chapters. Micro/Nano Heat Transfer explores the thermal design fundamentals for microscale heat

exchangers and the enhancement heat transfer for applications to heat exchanger design with nanofluids. It also examines single-phase forced convection correlations as well as flow friction

factors for microchannel flows for heat transfer and pumping power calculations. Polymer Heat Exchangers introduces an alternative design option for applications hindered by the operating limitations of

metallic heat exchangers. The appendices provide the thermophysical properties of various fluids. Each chapter contains examples illustrating thermal design methods and procedures and relevant nomenclature. End-

of-chapter problems enable students to test their assimilation of the material.
This book describes the characteristics of heat pipes under steady-state and transient operating

conditions. It emphasizes the physical aspects of heat pipe behavior and develops design formulas on the basis of mathematical models and empirical observation. The author take a tutorial approach, presenting

information on the application of heat pipe technology, design methods, and data to heat pipe cooling and heat exchange requirements. He provides the nonspecialist with sufficient understanding of

heat pipe technology to appreciate and assess its application potential, while also meeting the needs of the experienced heat pipe designer and researcher. Heat exchangers with minichannel and microchannel

flow passages are becoming increasingly popular due to their ability to remove large heat fluxes under single-phase and two-phase applications. Heat Transfer and Fluid Flow in Minichannels and

Microchannels methodically covers gas, liquid, and electrokinetic flows, as well as flow boiling and condensation, in minichannel and microchannel applications. Examining biomedical applications as

well, the book is an ideal reference for anyone involved in the design processes of microchannel flow passages in a heat exchanger. Each chapter is accompanied by a real-life case study New edition of

the first book that solely deals with heat and fluid flow in minichannels and microchannels Presents findings that are directly useful to designers; researchers can use the information in developing

new models or identifying research needs

Selection, Rating, and Thermal Design, Second Edition

Studies and Applications

Mass Transfer

A Problem-based Test Prep

for Students

Convective Heat Transfer

Heat Transfer

Design And Technology Of Heat Pipes For Cooling And Heat Exchange

Design, Experiment and Simulation

Selection, Rating, and Thermal Design, Third Edition

Inverse Heat Transfer

This festschrift in honor of Professor Budugur Lakshminarayana's 60th birthday-based on the proceedings of a symposium on Turbomachinery

Fluid Dynamics and Heat Transfer held recently at The Pennsylvania State University, University Park- provides authoritative and conclusive research results as well as new insights into complex flow features found in the turbomachinery used for propulsion, power, and industrial

applications. Explaining in detail compressors, heat transfer fields in turbines, computational fluid dynamics, and unsteady flows, Turbomachinery Fluid Dynamics and Heat Transfer covers: Mixing mechanisms, annulus wall boundary layers, and the flow field in transonic

turbocompressors The numerical implementation of turbulence models in a computer code Secondary flows, film cooling, and thermal turbulence modeling The visualization method of modeling using liquid crystals Innovative techniques in the computational modeling of

compressor and turbine flows measurement in unsteady flows as well as axial flows and compressor noise generation And much more Generously illustrated and containing key bibliographic citations, Turbomachinery Fluid Dynamics and Heat Transfer is an indispensable

resource for mechanical, design, aerospace, marine, manufacturing, materials, industrial, and reliability engineers; and upper-level undergraduate and graduate students in these disciplines.

This is a text/reference illustrating thermal and hydraulic design of heat

exchangers. The book shows how to apply the fundamentals of thermodynamics, heat transfer, and fluid dynamics for a systematic analysis of the phenomena in heat exchangers, important to energy effective operation in process plants. Beginning with illustrative examples

detailing applications of fundamentals, the text then shows the influence of flow configuration on the performance of heat exchangers. Here the equations to calculate mean temperature difference and efficiency for stirred tank, parallel, counter-and cross flow and their combinations are

derived and put together in a new and very compact way. In some cases, short computer programs are given to evaluate more complicated formulas or algorithms. Chapter 3 is comprised of seven fully worked out examples showing application of the fundamentals to thermal and

hydraulic design, i.e. sizing of heat exchangers. It includes problems and worked examples and is written in a self study format. The text should be useful to practicing engineers and also graduate students in chemical and mechanical engineering.

A single volume resource manual

*incorporating material from the Heat Exchanger Design Handbook, the standard reference material which is only available in loose-leaf format." Comprehensive and unique source integrates the material usually distributed among a half a dozen sources. * Presents a unified*

*approach to modeling of new designs and develops the skills for complex engineering analysis. * Provides industrial insight to the applications of the basic theory developed.*

Chemical Engineering Design

Heat Transfer in Process Engineering

Heat Transfer Equipment Design

Heat Exchangers

Compact Heat Exchangers

Principles, Practice and Economics of Plant and Process Design

Heat Exchanger Design Handbook, 1998

Concise Guide to Heat Exchanger Network Design