Heat Exchanger Design Guide

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 advances in PHEs New topics like EMbaffle®, Helixchanger®, and Twistedtube® heat 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 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.
The most complete guide of its kind, this is the standard handbook for chemical and process engineers. All new material on fluid flow, long pipe, fractionators, separators and accumulators, cooling towers, gas treating, blending, troubleshooting field cases, gas solubility, and density of irregular solids. This substantial addition of material will also include conversion tables and a new appendix, "Shortcut Equipment Design Methods."This convenient volume helps solve field engineering problems with its hundreds of common sense techniques, shortcuts, and calculations. Here, in a compact, easy-to-use format, are practical tips, handy formulas, correlations, curves, charts, tables, and shortcut methods that will save engineers valuable time and effort. Hundreds of common sense techniques and calculations help users quickly and accurately solve day-to-day design, operations, and equipment problems.
A description of the design, construction and applications of unfired heat exchangers used in the process industries, giving guidance on the merits and limitations of the different types, details of their materials of construction and cost and numerous examples of design calculations.
This is a fully revised and updated fourth edition of a classic guidebook. It covers the current requirements of the ASME Section VIII-1 as well as the requirements of the newly published VIII-2 .Whether you are a beginning design engineer or an experienced engineering manager developing a mechanical integrity program, this updated volume gives you a thorough examination and review of the requirements applicable to the design, material requirements, fabrication details, inspection requirements effecting joint efficiencies, and testing of pressure vessels and their components. Guidebook for Design of ASME Section VIII Pressure Vessels provides you with a review of the background issues, reference materials, technology, and techniques necessary for the safe, reliable, cost-efficient function of pressure vessels in the petrochemical, paper, power, and other industries. Solved examples throughout the volume illustrate the application of various equations given in both Sections VIII-1 and VIII-2.
The fourth edition of Ludwig's Applied Process Design for Chemical and Petrochemical Plants, Volume Three is a core reference for chemical, plant, and process engineers and provides an unrivalled reference on methods, process fundamentals, and supporting design data. New to this edition are expanded chapters on heat transfer plus additional chapters focused on the design of shell and tube heat exchangers, double pipe heat exchangers and air coolers. Heat tracer requirements for pipelines and heat loss from insulated pipelines are covered in this new edition, along with batch heating and cooling of process fluids, process integration, and industrial reactors. The book also looks at the troubleshooting of process equipment and corrosion and metallurgy. Assists engineers in rapidly analyzing problems and finding effective design methods and mechanical specifications Definitive guide to the selection and design of various equipment types, including heat exchanger sizing and compressor sizing, with established design codes Batch heating and cooling of process fluids supported by Excel programs
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.
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.

Heat Exchangers
Compact Heat Exchangers
A Practical Guide for Planning, Selecting and Designing of Shell and Tube Exchangers : with Numerous Practical Examples
Efficient Petrochemical Processes
Gas Dehydration Field Manual
Heat Exchanger Design Handbook
Design, Experiment and Simulation
Heat Exchanger Design Guide
Heat Exchanger Design Handbook, Second Edition
A Problem-based Test Prep for Students
Advanced Features and Applications

A tubular heat exchanger exemplifies many aspects of the challenge in designing a pressure vessel. High or very low operating pressures and temperatures, combined with sharp temperature gradients, and large differences in the stiffnesses of adjoining parts, are amongst the legion of conditions that behoove the attention of the heat exchanger designer. Pitfalls in mechanical design may lead to a variety of operational problems, such as tube-to-tubesheet joint failure, flanged joint leakage, weld cracks, tube buckling, and flow induced vibration. Internal failures, such as pass partition bowing or weld rip-out, pass partition gasket rib blow-out, and impingement actuated tube end erosion are no less menacing. Designing to avoid such operational perils requires a thorough grounding in several disciplines of mechanics, and a broad understanding of the inter relationship between the thermal and mechanical performance of heat exchangers. Yet, while there are a number of excellent books on heat ex changer thermal design, comparable effort in mechanical design has been non-existent. This apparent void has been filled by an assortment of national codes and industry standards, notably the "ASME Boiler and Pressure Vessel Code" and the "Standards of Tubular Exchanger Manufacturers Association. " These documents, in conjunction with scattered publications, form the motley compendia of the heat exchanger designer's reference source. The subject matter clearly beckons a methodical and comprehensive treatment. This book is directed towards meeting this need.
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.
Functionality, Advancements and Industrial Applications of Heat Pipes introduces heat pipe technologies and highlights a variety of applications for passive thermal control. The book begins with a thorough analysis of heat pipe infrastructure, including principles of operation, temperature limits, reliability and lessons learned from worked examples and case studies. It also presents a concise design guideline for the assembly of heat pipes. The second part moves on to consider a variety of modern day applications for the heat pipe principles discussed, covering nuclear and solar thermal energy engineering facilities as well as applications in space, in the sea and in the air. A final section works through manufacturing elements of different types of heat pipe to ensure they are well maintained and remain fully operational. This section includes the cleaning of parts, the assembly of the heat pipe, an analysis of gas blockages and how to deal with them, as well as performance verification. Analyzes a wide variety of heat pipes used in various settings, including constant-conductance heat pipes, loop heat pipes and wrap around heat pipes Considers applications at sea, in the air, on land and in space, including the nuclear and solar energy industries, heat pipes in spacecraft and heat pipe reactors Includes a heat pipe assembly and design guide, as well as an analysis of lessons learned from different case studies
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 engine
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.
This book covers the application of methods and tools for energy optimization and process design. It focuses the application of these methods on petrochemical process units such as the aromatics process unit. The book provides practical methods and tools to industrial practitioners with the focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields via better design, operation, and optimization. Broken down into six parts the book covers a range of topics including: Aromatics Process Description; Process Design Considerations; Petrochemical Separation Design; Process Integration; Process system optimization; Types of revamps; Equipment assessment; Common operating issues; and Troubleshooting case analysis to name a few.
Extend the life span of tubular heat exchangers with this bounty of inspection checklists and cost-containment tips. Featuring coverage of the two inspection codes used worldwide, plus techniques of plugging, ferruling, and sleeving, this guide helps you clean exchangers ... make shell-side repairs and alterations ... maintain tubesheets, bonnets, channels, and covers ... handle tube leaks ... increase reboiler capacity and repair reboiler shells ... conduct feedwater heater autopsies to prevent repetition of past design and operation errors ... and much more.

Engineering Flow and Heat Exchange
Design, Applications and Performance
Pinch Analysis and Process Integration
Fundamentals of Heat Exchanger Design
Tubular Heat Exchanger Inspection, Maintenance, and Repair
A HEAT TRANSFER TEXTBOOK
Studies and Applications
Heat Exchanger Design
Practical Thermal Design of Shell-And-Tube Heat Exchangers
Mechanical Design of Heat Exchangers
Heat Sinks, Thermoelectrics, Heat Pipes, Compact Heat Exchangers, and Solar Cells

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
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 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
Plate-and-frame heat exchangers (PHEs) are used in many different processes at a broad range of temperatures and with a variety of substances. Research into PHEs has increased considerably in recent years and this is a compilation of knowledge on the subject. Containing invited contributions from prominent and active investigators in the area, it should enable graduate students, researchers, and research and development engineers in industry to achieve a better understanding of transport processes. Some guidelines for design and development are also included.
Two-phase flow heat exchangers are vital components of systems for power generation, chemical processing, and thermal environment control. The art and science of the design of such heat exchangers have advanced considerably in recent years. This is due to better understanding of the fundamentals of two-phase flow and heat transfer in simple geometries, greater appreciation of these processes in complex goemetries, and enhanced predictive capability through use of complex computer codes. The subject is clearly of great fundamental and practical importance.
The NATO ASIan Thermal-Hydraulic Fundamentals and Design of Two-Phase Flow Heat Exchangers was held in Povoa de Varzim (near Porto), Portugal, July 6-17, 1987. participating in the organization of" the ASI were the Department of Mechanical Engineering and the Clean Energy Research Institute, University of Miami; Universidade do Porto; and the Department of Mechanical Engineering, Aeronautical Eng ineer ing, and Mechanics, Rensselaer Polytechnic Institute. The ASI was arranged primarily as a high-level teaching activity by experts representing both academic and industrial viewpoints. The program included the presentation of invited lectures, a limited number of related technical papers and discussion sessions.
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.
The third edition of Engineering Flow and Heat Exchange is the most practical textbook available on the design of heat transfer and equipment. This book is an excellent introduction to real-world applications for advanced undergraduates and an indispensable reference for professionals. The book includes comprehensive chapters on the different types and classifications of fluids, how to analyze fluids, and where a particular fluid fits into a broader picture. This book includes various a wide variety of problems and solutions – some whimsical and others directly from industrial applications. Numerous practical examples of heat transfer Different from other introductory books on fluids Clearly written, simple to understand, written for students to absorb material quickly Discusses non-Newtonian as well as Newtonian fluids Covers the entire field concisely Solutions manual with worked examples and solutions provided
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.

A Manual of Quick, Accurate Solutions to Everyday Process Engineering Problems
Heat Pipes
And Pressure Vessel Components
Functionality, Advancements and Industrial Applications of Heat Pipes
Technology, Design and Operation
Proceedings of the EUROTHERM Seminar No. 18, February 27 – March 1 1991, Hamburg, Germany
Theory, Design and Applications
Selection, Design & Construction
Symposium on Air-Cooled Heat Exchangers
Rules of Thumb for Mechanical Engineers
Concise Guide to Heat Exchanger Network Design

"Includes hydrate prevention, chemical injection systems, hydrate inhibitor methods; Condensation process, Glycol Regeneration and Molecular Sieves; An appendix provides the reader with additional exercises and solutions"--
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.
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.
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
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.
The Eurotherm Committee was created in 1986 from member countries of the European Community. It has the purpose of organising and coordinating scientific events such as seminars and conferences in the thermal sciences. The series of Eurotherm Seminars established by the Committee has become a popular forum for high-level scientific and technical interchange of ideas in a wide range of specialist topics. While the presentation and publication of papers at the Seminars are encouraged, the primary aim is to stimulate discussion and liaison between specialist groups. The present Chairman of Eurotherm is Professor C.J. Hoogendoorn of the Technical University, Delft (Fax [NL] 15, 783251). Information on Mure Seminars is available from the Secretary, Keith Cornwell, Heriot-Watt University, Edinburgh (Fax [UK] 31, 451, 3129). This particular Seminar No. 18 on the Design and Operation of Heat Exchangers was the first one on this topic and was held at the Universitat der Bundeswehr Hamburg (University of the Federal Armed Forces Hamburg) from February 27 to March 1 in 1991. The seminar was an international event and was attended by more than 60 scientists not only from countries of the European Community such as Belgium, France, Germany, Great Britain, and the Netherlands but also from other countries such as Canada, China, India, Israel, Romania, Soviet Union, Sweden and the United States of America.
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.

Heat Transfer Calculations
A Summary of Basic Heat Transfer and Flow Friction Design Data
Principles, Practice and Economics of Plant and Process Design
Heat Transfer
Ludwig's Applied Process Design for Chemical and Petrochemical Plants
A User Guide on Process Integration for the Efficient Use of Energy
Thermal Design
Two-Phase Flow Heat Exchangers
A Festschrift for A.L. London
Chemical Engineering Design
Rules of Thumb for Chemical Engineers

Pinch analysis and related techniques are the key to design of inherently energy-efficient plants. This book shows engineers how to understand and optimize energy use in their processes, whether large or small. Energy savings go straight to the bottom line as increased profit, as well as reducing emissions. This is the key guide to process integration for both experienced and newly qualified engineers, as well as academics and students. It begins with an introduction to the main concepts of pinch analysis, the calculation of energy targets for a given process, the pinch temperature and the golden rules of pinch-based design to meet energy targets. The book shows how to extract the stream data necessary for a pinch analysis and describes the targeting process in depth. Other essential details include the design of heat exchanger networks, hot and cold utility systems, CHP (combined heat and power), refrigeration and optimization of system operating conditions. Many tips and techniques for practical application are covered, supported by several detailed case studies and other examples covering a wide range of industries, including buildings and other non-process situations. The only dedicated pinch analysis and process integration guide, fully revised and expanded supported by free downloadable energy targeting software The perfect guide and reference for chemical process, food and biochemical engineers, plant engineers and professionals concerned with energy optimisation, including building designers Covers the practical analysis of both new and existing systems, with ful details of industrial applications and case studies
Heat Pipes, 6th Edition, takes a highly practical approach to the design and selection of heat pipes, making it an essential guide for practicing engineers and an ideal text for postgraduate students. This new edition has been revised to include new information on the underlying theory of heat pipes and heat transfer, and features fully updated applications, new data sections, and updated chapters on design and electronics cooling. The book is a useful reference for those with experience and an accessible introduction for those approaching the topic for the first time. Contains all information required to design and manufacture a heat pipe Suitable for use as a professional reference and graduate text Revised with greater coverage of key electronic cooling applications
Fluids -- Heat transfer -- Thermodynamics -- Mechanical seals -- Pumps and compressors -- Drivers -- Gears -- Bearings -- Piping and pressure vessels -- Tribology -- Vibration -- Materials -- Stress and strain -- Fatigue -- Instrumentation -- Engineering economics.

Guidebook for the Design of ASME Section VIII Pressure Vessels
A Practical Guide for Planning, Selecting and Designing of Shell and Tube Exchangers
Heat Transfer in Process Engineering
Plate Heat Exchangers
A Working Guide to Shell-and-tube Heat Exchangers
Selection, Rating, and Thermal Design, Third Edition
Design and Operation of Heat Exchangers
Thermal-Hydraulic Fundamentals and Design