

---

# File Type PDF Heat Recovery Steam Generators Understand The Basics

---

Yeah, reviewing a books **Heat Recovery Steam Generators Understand The Basics** could accumulate your near associates listings. This is just one of the solutions for you to be successful. As understood, triumph does not suggest that you have astounding points.

Comprehending as without difficulty as arrangement even more than additional will give each success. next to, the revelation as well as perception of this Heat Recovery Steam Generators Understand The Basics can be taken as without difficulty as picked to act.

---

**KEY=RECOVERY - MATHEWS CORDOVA**

---

**HEAT RECOVERY STEAM GENERATOR TECHNOLOGY**

---

*Woodhead Publishing* **Heat Recovery Steam Generator Technology is the first fully comprehensive resource to provide readers with the fundamental information needed to understand HRSGs. The book's highly experienced editor has selected a number of key technical personnel to contribute to the book, also including burner and emission control device suppliers and qualified practicing engineers. In the introduction, various types of HRSGs are identified and discussed, along with their market share. The fundamental principles of the technology are covered, along with the various components and design specifics that should be considered. Its simple organization makes finding answers quick and easy. The text is fully supported by examples and case studies, and is illustrated by photographs of components and completed power plants to further increase knowledge and understanding of HRSG technology. Presents the fundamental principles and theories behind HRSG technology that is supported by practical design examples and illustrations Includes practical applications of combined cycle power plants and waste recovery that are both fully covered and supported by optimization throughout the book Helps readers do a better job of specifying, procuring, installing, operating, and maintaining HRSGs**

---

---

## **INDUSTRIAL BOILERS AND HEAT RECOVERY STEAM GENERATORS**

---

---

### **DESIGN, APPLICATIONS, AND CALCULATIONS**

---

---

*CRC Press* Filled with over 225 boiler/HRSG operation and design problems, this book covers steam generators and related systems used in process plants, refineries, chemical plants, electrical utilities, and other industrial settings. Emphasizing the thermal engineering aspects, the author provides information on the design and performance of steam generators

---

---

## **STEAM GENERATORS AND WASTE HEAT BOILERS**

---

---

### **FOR PROCESS AND PLANT ENGINEERS**

---

---

*CRC Press* Incorporates Worked-Out Real-World Problems Steam Generators and Waste Heat Boilers: For Process and Plant Engineers focuses on the thermal design and performance aspects of steam generators, HRSGs and fire tube, water tube waste heat boilers including air heaters, and condensing economizers. Over 120 real-life problems are fully worked out which will help plant engineers in evaluating new boilers or making modifications to existing boiler components without assistance from boiler suppliers. The book examines recent trends and developments in boiler design and technology and presents novel ideas for improving boiler efficiency and lowering gas pressure drop. It helps plant engineers understand and evaluate the performance of steam generators and waste heat boilers at any load. Learn How to Independently Evaluate the Thermal Performance of Boilers and Their Components This book begins with basic combustion and boiler efficiency calculations. It then moves on to estimation of furnace exit gas temperature (FEGT), furnace duty, view factors, heat flux, and boiler circulation calculations. It also describes trends in large steam generator designs such as multiple-module; elevated drum design types of boilers such as D, O, and A; and forced circulation steam generators. It illustrates various options to improve boiler efficiency and lower operating costs. The author addresses the importance of flue gas analysis, fire tube versus water tube boilers used in chemical plants, and refineries. In addition, he describes cogeneration systems; heat recovery in sulfur plants, hydrogen plants, and cement plants; and the effect of fouling factor on performance. The book also explains HRSG simulation process and illustrates calculations for complete performance evaluation of boilers and their components. Helps plant engineers make independent evaluations of thermal performance of boilers before purchasing them Provides

numerous examples on boiler thermal performance calculations that help plant engineers develop programming codes with ease Follows the metric and SI system, and British units are shown in parentheses wherever possible Includes calculation procedures for the basic sizing and performance evaluation of a complete steam generator or waste heat boiler system and their components with appendices outlining simplified procedures for estimation of heat transfer coefficients Steam Generators and Waste Heat Boilers: For Process and Plant Engineers serves as a source book for plant engineers, consultants, and boiler designers.

---

## **WASTE HEAT RECOVERY IN PROCESS INDUSTRIES**

---

*John Wiley & Sons* Explore modern waste heat recovery technology across a variety of industries In **Waste Heat Recovery in Process Industries**, esteemed thermal engineer Hussam Jouhara delivers an organized and comprehensive exploration of waste heat recovery systems with a focus on industrial applications in different temperature ranges. The author describes various waste heat recovery systems, like heat exchangers, waste heat boilers, air preheaters, direct electrical conversion devices, and thermal storage. The book also offers discussions of the technologies and applications relevant to different temperature ranges present in industrial settings along with revealing case studies from various industries. **Waste Heat Recovery in Process Industries** examines a variety of industries, from steel to ceramics, chemicals, and food, and how plants operating in these sectors can use waste heat to improve their energy efficiency, reduce energy costs, and minimize their carbon footprint. The book also offers: A thorough introduction to waste heat recovery systems, including recuperative and regenerative burners, heat exchangers, waste heat boilers, air preheaters, and heat pumps Comprehensive explorations of low temperature applications, below 100°C, including advantages and drawbacks, as well as illustrative case studies Practical discussions of medium temperature applications, between 100°C and 400°C, including case studies In-depth examination of high temperature applications, above 400°C, including several case studies Perfect for chemical, mechanical, process, and power engineers, **Waste Heat Recovery in Process Industries** is also an ideal resource for professionals working in the chemical, metal processing, pharmaceutical, and food industries.

---

## **ENCYCLOPEDIA OF CHEMICAL PROCESSING AND DESIGN**

---

---

### **VOLUME 64 - WASTE: HAZARDOUS: MANAGEMENT GUIDE TO WASTE: NUCLEAR: MINIMIZATION DURING**

---

---

## DECOMMISSIONING

---

*CRC Press* "Waste, Hazardous, Management Guide to Waste, Nuclear, Minimizing during Decommissioning"

---

## WASTE HEAT BOILER DESKBOOK

---

*Prentice Hall* Covers the design and application of waste heat boilers for industrial, cogeneration and municipal solid waste applications. Real-life case studies aid the understanding of the specifications, operations and application of waste heat boilers.

---

## SUSTAINABLE ENERGY TECHNOLOGY AND POLICIES

---

### A TRANSFORMATIONAL JOURNEY, VOLUME 1

---

*Springer* This book presents a state-of-the-art compilation focusing on both technological and policy aspects of sustainable energy production and consumption, which deals with issues like the need for and planning of smart cities, alternative transport fuel options, sustainable power production, pollution control technologies etc. The book comprises contributions from experts from all over the world, and addresses energy sustainability from different viewpoints. Specifically, the book focuses on energy sustainability in the Indian scenario with a background of the global perspective. Contributions from academia, policy makers and industry are included to address the challenge from different perspectives. The contents of this book will prove useful to researchers, professionals, and policy makers working in the area of green and sustainable energy.

---

## EXERGY FOR A BETTER ENVIRONMENT AND IMPROVED SUSTAINABILITY 1

---

### FUNDAMENTALS

---

*Springer* This multi-disciplinary book presents the most recent advances in exergy, energy, and environmental issues. **Volume 1** focuses on fundamentals in the field and covers current problems, future needs, and prospects in the area of energy and environment from researchers worldwide. Based on selected lectures from the Seventh International Exergy, Energy and Environmental Symposium (IEEES7-2015) and complemented by further invited contributions, this comprehensive set of contributions promote the exchange of new ideas and techniques in energy conversion and

conservation in order to exchange best practices in "energetic efficiency". Included are fundamental and historical coverage of the green transportation and sustainable mobility sectors, especially regarding the development of sustainable technologies for thermal comforts and green transportation vehicles. Furthermore, contributions on renewable and sustainable energy sources, strategies for energy production, and the carbon-free society constitute an important part of this book. *Exergy for Better Environment and Sustainability, Volume 1* will appeal to researchers, students, and professionals within engineering and the renewable energy fields.

---

### **GAS TURBINE PERFORMANCE**

---

*John Wiley & Sons* A significant addition to the literature on gas turbine technology, the second edition of *Gas Turbine Performance* is a lengthy text covering product advances and technological developments. Including extensive figures, charts, tables and formulae, this book will interest everyone concerned with gas turbine technology, whether they are designers, marketing staff or users.

---

### **GAS TURBINE ENGINEERING HANDBOOK**

---

*Elsevier* The *Gas Turbine Engineering Handbook* has been the standard for engineers involved in the design, selection, and operation of gas turbines. This revision includes new case histories, the latest techniques, and new designs to comply with recently passed legislation. By keeping the book up to date with new, emerging topics, Boyce ensures that this book will remain the standard and most widely used book in this field. The new Third Edition of the *Gas Turbine Engineering Hand Book* updates the book to cover the new generation of Advanced gas Turbines. It examines the benefit and some of the major problems that have been encountered by these new turbines. The book keeps abreast of the environmental changes and the industries answer to these new regulations. A new chapter on case histories has been added to enable the engineer in the field to keep abreast of problems that are being encountered and the solutions that have resulted in solving them. Comprehensive treatment of Gas Turbines from Design to Operation and Maintenance. In depth treatment of Compressors with emphasis on surge, rotating stall, and choke; Combustors with emphasis on Dry Low NOx Combustors; and Turbines with emphasis on Metallurgy and new cooling schemes. An excellent introductory book for the student and field engineers A special maintenance section dealing with the advanced gas turbines, and special diagnostic charts have been provided that will enable the reader to troubleshoot problems he encounters in the field The third edition consists of many Case Histories of Gas Turbine problems. This

should enable the field engineer to avoid some of these same generic problems

---

## **APPLIED ENERGY**

---

### **AN INTRODUCTION**

---

*CRC Press* Written in clear, concise language and designed for an introductory applied energy course, **Applied Energy: An Introduction** discusses energy applications in small-medium enterprises, solar energy, hydro and wind energy, nuclear energy, hybrid energy, and energy sustainability issues. Focusing on renewable energy technologies, energy conversion, and conservation and the energy industry, the author lists the key aspects of applied energy and related studies, taking a question-based approach to the material that is useful for both undergraduate students and postgraduates who want a broad overview of energy conversion. The author carefully designed the text to motivate students and give them the foundation they need to place the concepts presented into a real-world context. He begins with an introduction to the basics and the definitions used throughout the book. From there, he covers the energy industry and energy applications; energy sources, supply, and demand; and energy management, policy, plans, and analysis. Building on this, the author elucidates various energy saving technologies and energy storage methods, explores the pros and cons of fossil fuels and alternative energy sources, and examines the various types of applications of alternative energies. The book concludes with chapters on hybrid energy technology, hybrid energy schemes, other energy conversion methods, and applied energy issues. The book takes advantage of practical and application-based learning, presenting the information in various forms such as essential notes followed by practical projects, assignments, and objective and practical questions. In each chapter, a small section introduces some elements of applied energy design and innovation, linking knowledge with applied energy design and practice. The comprehensive coverage gives students the skills not only to master the concepts in the course, but also apply them to future work in this area.

---

### **DESIGN OF THERMAL OXIDATION SYSTEMS FOR VOLATILE ORGANIC COMPOUNDS**

---

*CRC Press* Controlling the emission of volatile organic compounds (VOC) became a very prominent environmental issue with the passage of the 1990 Clean Air Act Amendments, and will continue to be an environmental priority through the next decade. No single technology has played as important a role in the control of VOC emissions as thermal oxidation. It has the ability to destroy VOCs in a one-step process that produces innocuous by-products. Design of Thermal

**Oxidation Systems for Volatile Organic Compounds** provides all the information needed for developing a thermal oxidation design in a single reference. It covers design, operation, and maintenance as well as the principles behind the classification of volatile organic compounds as hazardous waste. The author explores the primary purpose of thermal oxidizers and discusses their limitations. The book provides: practical, complete, and concise thermal oxidizer design principles an outline of state-of-the-art design principles a practical rather than theoretical approach real industrial examples in each chapter With the new regulations that affect VOC emissions, engineers from such diverse fields as oil refining, chemical distillation and separation processes, and pharmaceutical industries will need to design and implement thermal oxidation systems. **Design of Thermal Oxidation Systems for Volatile Organic Compounds** provides a reference to the entire design process, from conceptualization to operation and maintenance.

---

### **STEAM PLANT CALCULATIONS MANUAL, REVISED AND EXPANDED**

---

*CRC Press* Maintaining a question-and-answer format, this second edition provides simplified means of solving nearly **200 practical problems** that confront engineers involved in the planning, design, operation and maintenance of steam plant systems. Calculations pertaining to emissions, boiler efficiency, circulation and heat transfer equipment design and performance are provided. Solutions to 70 new problems are featured in this edition.

---

### **COMBINED-CYCLE GAS & STEAM TURBINE POWER PLANTS**

---

*Pennwell Corporation* This title provides a reference on technical and economic factors of combined-cycle applications within the utility and cogeneration markets. Kehlhofer - and his co-authors give the reader tips on system layout, details on controls and automation, and operating instructions.

---

### **CHEMICAL ENGINEERING PROGRESS**

---

---

### **FUNDAMENTALS AND APPLICATIONS OF SUPERCRITICAL CARBON DIOXIDE (SCO<sub>2</sub>) BASED POWER CYCLES**

---

*Woodhead Publishing* **Fundamentals and Applications of Supercritical Carbon Dioxide (SCO<sub>2</sub>) Based Power Cycles** aims to provide engineers and researchers with an authoritative overview of research and technology in this area. Part One introduces the technology and reviews the properties of SCO<sub>2</sub> relevant to power cycles. Other sections of the book address components for SCO<sub>2</sub> power cycles, such as turbomachinery expanders, compressors, recuperators, and

design challenges, such as the need for high-temperature materials. Chapters on key applications, including waste heat, nuclear power, fossil energy, geothermal and concentrated solar power are also included. The final section addresses major international research programs. Readers will learn about the attractive features of SC02 power cycles, which include a lower capital cost potential than the traditional cycle, and the compounding performance benefits from a more efficient thermodynamic cycle on balance of plant requirements, fuel use, and emissions. Represents the first book to focus exclusively on SC02 power cycles Contains detailed coverage of cycle fundamentals, key components, and design challenges Addresses the wide range of applications of SC02 power cycles, from more efficient electricity generation, to ship propulsion

---

## **BOILERS FOR POWER AND PROCESS**

---

*CRC Press* Boiler professionals require a strong command of both the theoretical and practical facets of water tube-boiler technology. From state-of-the-art boiler construction to mechanics of firing techniques, **Boilers for Power and Process** augments seasoned engineers' already-solid grasp of boiler fundamentals. A practical explanation of theory, it d

---

## **STEAM GENERATION FROM BIOMASS**

---



---

### **CONSTRUCTION AND DESIGN OF LARGE BOILERS**

---

*Butterworth-Heinemann* **Steam Generation from Biomass: Construction and Design of Large Boilers** provides in-depth coverage of steam generator engineering for biomass combustion. It presents the design process and the necessary information needed for an understanding of not only the function of different components of a steam generator, but also what design choices have been made. Professor Vakkilainen explores each particular aspect of steam generator design from the point-of-view of pressure part design, mechanical design, layout design, process design, performance optimization, and cost optimization. Topics such as fuels and their emissions, steam-water circulation, auxiliary equipment, availability and reliability, measurements and control, manufacture, erection, and inspection are covered. Special attention is given to recovery boilers and fluidized bed boilers, and automated design and dimensioning calculation spreadsheets are available for download at the book's companion website. This book is intended for both design engineers and steam boiler operators, as well as those involved in plant management and equipment purchasing. Provides a complete overview of biomass steam boilers, including processes, phenomena, and

nomenclature Presents a clear view of how biomass boilers differ from fossil fuel boilers Covers the most used types of large-scale biomass boilers, including recovery boilers, fluidized bed boilers, and auxiliary equipment Includes a companion website with spreadsheets, calculation examples, and automatic calculation tools for design and dimensioning

---

## **GAS TURBINES FOR ELECTRIC POWER GENERATION**

---

*Cambridge University Press* Everything you wanted to know about industrial gas turbines for electric power generation in one source with hard-to-find, hands-on technical information.

---

## **THE CAD GUIDEBOOK**

---

---

## **A BASIC MANUAL FOR UNDERSTANDING AND IMPROVING COMPUTER-AIDED DESIGN**

---

*CRC Press* With an extensive glossary of key terms and concepts, this volume presents fundamental principles and theories in the function, application, management and design of 2 and 3D CAD systems. It also provides useful end-of-chapter review questions.

---

## **MECHANICAL WEAR FUNDAMENTALS AND TESTING, REVISED AND EXPANDED**

---

*CRC Press* Written by a tribological expert with more than thirty years of experience in the field, **Mechanical Wear Fundamentals and Testing, Second Edition** compiles an extensive range of graphs, tables, micrographs, and drawings to illustrate wear, friction, and lubrication behavior in modern engineering applications. The author promotes a clear understanding

---

## **FUNDAMENTALS OF FLUID FILM LUBRICATION**

---

*CRC Press* Specifically focusing on fluid film, hydrodynamic, and elastohydrodynamic lubrication, this edition studies the most important principles of fluid film lubrication for the correct design of bearings, gears, and rolling operations, and for the prevention of friction and wear in engineering designs. It explains various theories, procedures, and equations for improved solutions to machining challenges. Providing more than 1120 display equations and an introductory section in each chapter, **Fundamentals of Fluid Film Lubrication, Second Edition** facilitates the analysis of any machine

element that uses fluid film lubrication and strengthens understanding of critical design concepts.

---

## **ENCYCLOPEDIA OF CHEMICAL PROCESSING AND DESIGN**

---

### **FUNDAMENTALS OF NATURAL GAS PROCESSING**

---

*CRC Press* **Fundamentals of Natural Gas Processing** explores the natural gas industry from the wellhead to the marketplace. It compiles information from the open literature, meeting proceedings, and experts to accurately depict the state of gas processing technology today and highlight technologies that could become important in the future. This book cov

---

### **FUNDAMENTALS OF METAL MACHINING AND MACHINE TOOLS, THIRD EDITION**

---

*CRC Press* In the more than 15 years since the second edition of **Fundamentals of Machining and Machine Tools** was published, the industry has seen many changes. Students must keep up with developments in analytical modeling of machining processes, modern cutting tool materials, and how these changes affect the economics of machining. With coverage reflecting state-of-the-art industry practice, **Fundamentals of Machining and Machine Tools, Third Edition** emphasizes underlying concepts, analytical methods, and economic considerations, requiring only basic mathematics and physics. This book thoroughly illustrates the causes of various phenomena and their effects on machining practice. The authors include several descriptions of modern analytical methods, outlining the strengths and weaknesses of the various modeling approaches. What's New in the Third Edition? Recent advances in super-hard cutting tool materials, tool geometries, and surface coatings Advances in high-speed machining and hard machining New trends in cutting fluid applications, including dry and minimum-quantity lubrication machining New developments in tool geometries for chip breaking and chip control Improvements in cost modeling of machining processes, including application to grinding processes Supplying abundant examples, illustrations, and homework problems, **Fundamentals of Machining and Machine Tools, Third Edition** is an ideal textbook for senior undergraduate and graduate students studying metal cutting, machining, machine tool technology, machining applications, and manufacturing processes.

---

### **HANDBOOK FOR COGENERATION AND COMBINED CYCLE POWER PLANTS**

---

*Amer Society of Mechanical* This comprehensive Handbook has been fully updated and expanded for the second edition. It

**covers all major aspects of power plant design, operation, and maintenance. The second edition includes not only an updating of the technology, which has taken great leaps forward in the last decade, but also introduces new subjects such as Carbon Sequestration Technology, Chemical Treatment of Water used in Combined Cycle Power Plants, and extended treatments on Steam Turbines and Heat Recovery Steam Generators. A new Chapter has been introduced entitled, "Case Histories of Problems Encountered in Cogeneration and Combined Cycle Power Plants." This is an extensive treatise with 145 figures and photographs illustrating the many problems associated with Combined Cycle Power Plants and some of the solutions that have enabled plants to achieved higher efficiencies and reliability. This new edition assimilates subject matter of various papers, and sometimes diverse views, into a comprehensive, unified treatment of Combined Cycle Power Plants. Illustrations, with curves and tables are extensively employed to broaden the understanding of the descriptive text. The book has many special features which include comparison of various energy systems, latest cycles and power augmentation and improved efficiency techniques. All the major plant equipment used in Combined Cycle and Cogeneration Power Plants has been addressed.**

---

## **ENERGY PRODUCTION SYSTEMS ENGINEERING**

---

*John Wiley & Sons* **Energy Production Systems Engineering presents IEEE, Electrical Apparatus Service Association (EASA), and International Electrotechnical Commission (IEC) standards of engineering systems and equipment in utility electric generation stations. Includes fundamental combustion reaction equations Provides methods for measuring radioactivity and exposure limits Includes IEEE, American Petroleum Institute (API), and National Electrical Manufacturers Association (NEMA) standards for motor applications Introduces the IEEE C37 series of standards, which describe the proper selections and applications of switchgear Describes how to use IEEE 80 to calculate the touch and step potential of a ground grid design This book enables engineers and students to acquire through study the pragmatic knowledge and skills in the field that could take years to acquire through experience alone.**

---

## **POWER GENERATION HANDBOOK**

---

*McGraw Hill Professional* **We've all lived through long hot summers with power shortages, brownouts, and blackouts. But at last, all the what-to-do and how-to-do it information you'll need to handle a full range of operation and maintenance tasks at your fingertips. Written by a power industry expert, Power Generation Handbook: Selection, Applications, Operation, Maintenance helps you to gain a thorough understanding of all components, calculations, and subsystems**

of the various types of gas turbines, steam power plants, co-generation, and combined cycle plants. Divided into five sections, **Power Generation Handbook: Selection, Applications, Operation, Maintenance** provides a thorough understanding of co-generation and combined cycle plants. Each of the components such as compressors, gas and steam turbines, heat recovery steam generators, condensers, lubricating systems, transformers, and generators are covered in detail. The selection considerations, operation, maintenance and economics of co-generation plants and combined cycles as well as emission limits, monitoring and governing systems will also be covered thoroughly. This all-in-one resource gives you step-by-step guidance on how to maximize the efficiency, reliability and longevity of your power generation plant.

---

### **PRACTICAL PLANT FAILURE ANALYSIS**

---

### **A GUIDE TO UNDERSTANDING MACHINERY DETERIORATION AND IMPROVING EQUIPMENT RELIABILITY**

---

*CRC Press* **Component failures result from a combination of factors involving materials science, mechanics, thermodynamics, corrosion, and tribology. With the right guidance, you don't have to be an authority in all of these areas to become skilled at diagnosing and preventing failures. Based on the author's more than thirty years of experience, Practical Plant Failure Analysis: A Guide to Understanding Machinery Deterioration and Improving Equipment Reliability is a down-to-earth guide to improving machinery maintenance and reliability. Illustrated with hundreds of diagrams and photographs, this book examines...**

- When and how to conduct a physical failure analysis
- Basic material properties including heat treating mechanisms, work hardening, and the effects of temperature changes on material properties
- The differences in appearance between ductile overload, brittle overload, and fatigue failures
- High cycle fatigue and how to differentiate between high stress concentrations and high operating stresses
- Low cycle fatigue and unusual fatigue situations
- Lubrication and its influence on the three basic bearing designs
- Ball and roller bearings, gears, fasteners, V-belts, and synchronous belts

Taking a detailed and systematic approach, **Practical Plant Failure Analysis** thoroughly explains the four major failure mechanisms—wear, corrosion, overload, and fatigue—as well as how to identify them. The author clearly identifies how these mechanisms appear in various components and supplies convenient charts that demonstrate how to identify the specific causes of failure.

---

### **OPTIMAL CONTROL OF INDUCTION HEATING PROCESSES**

---

*CRC Press* **This book introduces new approaches to solving optimal control problems in induction heating process**

applications. **Optimal Control of Induction Heating Processes** demonstrates how to apply and use new optimization techniques for different types of induction heating installations. Focusing on practical methods for solving real engineering optimization problems, the text features a variety of specific optimization examples for induction heater modes and designs, particularly those used in industrial applications. The book describes basic physical phenomena in induction heating and induction heating process (IHP) optimization problems as well as IHP mathematical models for practical use. It explains the fundamentals of the new exact method and the advantages it offers over other well-known methods. A sound introduction to the broad theory of optimal control, **Optimal Control of Induction Heating Processes** presents a clear and accessible approach to the modern design and control of practical, cost-effective induction heating processes. This book is ideal for all students, production managers, engineers, designers, scientists, and users of induction heating machinery who would like to study, design, and improve processes of induction mass heating.

---

## **INDUSTRIAL HEATING**

---

---

### **PRINCIPLES, TECHNIQUES, MATERIALS, APPLICATIONS, AND DESIGN**

---

*CRC Press* Industry relies on heating for a wide variety of processes involving a broad range of materials. Each process and material requires heating methods suitable to its properties and the desired outcome. Despite this, the literature lacks a general reference on design techniques for heating, especially for small- and medium-sized applications. **Industrial Heating: Principles, Techniques, Materials, Applications, and Design** fills this gap, presenting design information for both traditional and modern heating processes and auxiliary techniques. The author leverages more than 40 years of experience into this comprehensive, authoritative guide. The book opens with fundamental topics in steady state and transient heat transfer, fluid mechanics, and aerodynamics, emphasizing analytical concepts over mathematical rigor. A discussion of fuels, their combustion, and combustion devices follows, along with waste incineration and its associated problems. The author then examines techniques related to heating, such as vacuum technology, pyrometry, protective atmosphere, and heat exchangers as well as refractory, ceramic, and metallic materials and their advantages and disadvantages. Useful appendices round out the presentation, supplying information on underlying principles such as pressure and thermal diffusivity. Replete with illustrations, examples, and solved problems, **Industrial Heating** provides a much-needed treatment of all aspects of heating systems, reflecting the advances in both process and technology over the past half-century.

---

---

**PROCEEDINGS OF THE ... INTERNATIONAL JOINT POWER GENERATION CONFERENCE**

---

---

---

---

**PRESENTED AT THE ... INTERNATIONAL JOINT POWER GENERATION CONFERENCE**

---

---

---

---

**INTERMEDIATE HEAT TRANSFER**

---

---

*CRC Press* Equipping practicing engineers and students with the tools to independently assess and understand complex material on the topic, this text is an ideal precursor to advanced heat transfer courses. Intermediate Heat Transfer discusses numerical analysis in conduction and convection, temperature-dependent thermal conductivity, conduction through a sla

---

---

**FINITE ELEMENT METHOD**

---

---

---

---

**APPLICATIONS IN SOLIDS, STRUCTURES, AND HEAT TRANSFER**

---

---

*CRC Press* The finite element method (FEM) is the dominant tool for numerical analysis in engineering, yet many engineers apply it without fully understanding all the principles. Learning the method can be challenging, but Mike Gosz has condensed the basic mathematics, concepts, and applications into a simple and easy-to-understand reference. Finite Element Method: Applications in Solids, Structures, and Heat Transfer navigates through linear, linear dynamic, and nonlinear finite elements with an emphasis on building confidence and familiarity with the method, not just the procedures. This book demystifies the assumptions made, the boundary conditions chosen, and whether or not proper failure criteria are used. It reviews the basic math underlying FEM, including matrix algebra, the Taylor series expansion and divergence theorem, vectors, tensors, and mechanics of continuous media. The author discusses applications to problems in solid mechanics, the steady-state heat equation, continuum and structural finite elements, linear transient analysis, small-strain plasticity, and geometrically nonlinear problems. He illustrates the material with 10 case studies, which define the problem, consider appropriate solution strategies, and warn against common pitfalls. Additionally, 35 interactive virtual reality modeling language files are available for download from the CRC Web site. For anyone first studying FEM or for those who simply wish to deepen their understanding, Finite Element Method: Applications in Solids, Structures, and Heat Transfer is the perfect resource.

---

## **NUMERICAL SIMULATION FOR NEXT GENERATION THERMAL POWER PLANTS**

---

*Springer* The book provides highly specialized researchers and practitioners with a major contribution to mathematical models' developments for energy systems. First, dynamic process simulation models based on mixture flow and two-fluid models are developed for combined-cycle power plants, pulverised coal-fired power plants, concentrated solar power plant and municipal waste incineration. Operation data, obtained from different power stations, are used to investigate the capability of dynamic models to predict the behaviour of real processes and to analyse the influence of modeling assumptions on simulation results. Then, a computational fluid dynamics (CFD) simulation programme, so-called DEMEST, is developed. Here, the fluid-solid, particle-particle and particle-wall interactions are modeled by tracking all individual particles. To this purpose, the deterministic Euler-Lagrange/Discrete Element Method (DEM) is applied and further improved. An emphasis is given to the determination of inter-phase values, such as volumetric void fraction, momentum and heat transfers, using a new procedure known as the offset-method and to the particle-grid method allowing the refinement of the grid resolution independently from particle size. Model validation is described in detail. Moreover, thermochemical reaction models for solid fuel combustion are developed based on quasi-single-phase, two-fluid and Euler-Lagrange/MP-PIC models. Measurements obtained from actual power plants are used for validation and comparison of the developed numerical models.

---

## **HANDBOOK OF LEAD-FREE SOLDER TECHNOLOGY FOR MICROELECTRONIC ASSEMBLIES**

---

*CRC Press* This reference provides a complete discussion of the conversion from standard lead-tin to lead-free solder microelectronic assemblies for low-end and high-end applications. Written by more than 45 world-class researchers and practitioners, the book discusses general reliability issues concerning microelectronic assemblies, as well as factors specif

---

## **HANDBOOK OF PNEUMATIC CONVEYING ENGINEERING**

---

*CRC Press* Pneumatic conveying systems offer enormous advantages: flexibility in plant layout, automatic operation, easy control and monitoring, and the ability to handle diverse materials, especially dangerous, toxic, or explosive materials. The Handbook of Pneumatic Conveying Engineering provides the most complete, comprehensive reference on all types and s

---

**TARGET COSTING**

---

---

**MARKET DRIVEN PRODUCT DESIGN**

---

*CRC Press* **Compiling practical recommendations gleaned from more than 20 years of professional experience, Target Costing: Market Driven Product Design provides numerous examples from field authorities that illustrate valuable concepts and approaches employed in the application of target costing to large-scale manufacturing operations. The authors discuss setting the target product level and subsystem level, maintaining competitive costs, applying the principles of target costing in practice, and quantifying customers' needs.**

---

**HANDBOOK OF MECHANICAL ALLOY DESIGN**

---

*CRC Press* **Offering one of the field's most thorough treatments of material design principles, including a concise overview of fastener design, the Handbook of Mechanical Alloy Design provides an extensive overview of the effects of alloy compositional design on expected mechanical properties. This reference highlights the design elements that must be considered in risk-based metallurgical design and covers alloy design for a broad range of materials, including the increasingly important powder metal and metal matrix alloys. It discusses the design issues associated with carbon, alloy, and tool steels, microalloyed steels, and more. The Handbook of Mechanical Alloy Design is a must-have reference.**

---

**ENGINEERING DESIGN FOR WEAR, REVISED AND EXPANDED**

---

*CRC Press* **A modern presentation of approaches to wear design, this significantly revised and expanded second edition offers methods suited for meeting specific wear performance requirements, numerous design studies highlighting strategies for use with different tribological elements and mechanical systems, proven tactics for resolving wear-related problems,**