Modern Gas Turbine Combined Cycle Bechtel

Dictionary of ENVIRONMENTAL SCIENCE and TECHNOLOGY Dictionary of ENVIRONMENTAL SCIENCE and TECHNOLOGY FOURTH EDITION This superb and highly-acclaimed dictionary includes over 4000 in-depth entries on scientific and technical terminology, associated with environmental protection and resource management. In addition, it contains numerous illustrations, a wide range of international case

studies and extensive cross-references to guide the reader. The fourth edition represents a major update with 30% new material, additional illustrations and a greatly expanded list of relevant web resources. Reviews of previous editions: This is a veritable Whitakers' Almanac of useful information on all aspects of science and the natural environment, and its author needs little introduction. It is as useful for dipping into — being crammed with fascinating facts — as it is for checking definitions. Essential for layman and specialist alike. ...Porteous' book will contribute to better

understanding and protection of the world's environment... This dictionary is highly recommended as a valuable reference for both students and professionals working in environmental science and technology. ...a formidable rival of many much more expensive and heavier volumes. Porteous succeeds to precisely describe the chosen terms without compromise to readability. Cross-references nicely bring together additional or related information. The reader is often captured by the well-written text and is kept reading far beyond the sought-after term. Environmental Geology

Dictionary of Environmental Science and Technology, Fourth Edition will be an indispensable reference for all students and professionals concerned with world's environment.

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

An authoritative guide to the most up-to-date information on power system dynamics The revised third edition of Power System Dynamics and Stability contains a comprehensive, state-of-the-art review of information on the topic. The third edition continues the successful approach of the first and second editions by progressing from simplicity to complexity. It places the emphasis first on understanding the underlying physical principles before

proceeding to more complex models and algorithms. The book is illustrated by a large number of diagrams and examples. The third edition of Power System Dynamics and Stability explores the influence of wind farms and virtual power plants, power plants inertia and control strategy on power system stability. The authors—noted experts on the topic—cover a range of new and expanded topics including: Wide-area monitoring and control systems. Improvement of power system stability by optimization of control systems parameters. Impact of renewable energy sources on power system dynamics.

The role of power system stability in planning of power system operation and transmission network expansion. Real regulators of synchronous generators and field tests. Selectivity of power system protections at power swings in power system. Criteria for switching operations in transmission networks. Influence of automatic control of a tap changing step-up transformer on the power capability area of the generating unit. Mathematical models of power system components such as HVDC links, wind and photovoltaic power plants. Data of sample (benchmark) test systems. Power System

Dynamics: Stability and Control, Third Edition is an essential resource for students of electrical engineering and for practicing engineers and researchers who need the most current information available on the topic.

"There is currently no comparable book available that covers both the history and future potential applications of closed-cycle gas turbines. This book is intended for design engineers and engineering managers in the worldwide gas turbine/power generation industry. Upper-level engineering students and schools of engineering would

also benefit from this book, as it allows students to work and calculate different cycles and encourages them to make their own innovations."--Jacket.

Gas Turbines for Electric Power Generation

Fossil Energy Update

Combined Heat and Power

Steam Turbines for Modern Fossil-Fuel Power Plants

Power System Dynamics

Performance and Operability

This book tells the story of the power generation gas turbine from the perspective of one of the leading companies in the field over a period of nearly 100 years, written

by an engineer. Especially in times of imminent global economic crises it appears to be worthwhile to reflect on real economic values based on engineering ingenuity and enduring management of technological leadership. Though the book is primarily designed as a technical history of the BBC/ABB/Alstom power generation gas turbines, its scope is sufficiently broad to cover general development trends, including parallel competitor activities. A special benefit is the

historical breakdown to the gas turbine component level, so that the book actually outlines the development of axial compressors from early beginnings, the progress in combustion technology towards extraordinary low emission values and that of axial turbines with special emphasis on early turbine cooling innovations. The sheer length of certain engineering developments over several decades allows interesting historic observations and deductions on inherent

business mechanisms, the effects of technology preparations and organisational consequences. A look into the mirror of the past provides revelations on the impact of far-reaching business decisions. 2017 Winner of the Historian Engineer Award of the ASME (American Society of Mechanical Engineers
This book discusses recent developments in dynamic reliability in multi-state systems (MSS), addressing such important issues as reliability and availability analysis of

aging MSS, the impact of initial conditions on MSS reliability and availability, changing importance of components over time in MSS with aging components, and the determination of age-replacement policies. It also describes modifications of traditional methods, such as Markov processes with rewards, as well as a modern mathematical method based on the extended universal generating function technique, the Lz-transform, presenting various successful

applications and demonstrating their use in real-world problems. This book provides theoretical insights, information on practical applications, and real-world case studies that are of interest to engineers and industrial managers as well as researchers. It also serves as a textbook or supporting text for graduate and postgraduate courses in industrial, electrical, and mechanical engineering.

Externally Fired Combined Cycles (EFCCs) can increase the amount of

electricity produced from ash bearing fuels up to 40%, with overall powerplant efficiencies in excess of 45%. Achieving such high efficiencies requires high temperature-high pressure air heaters capable of driving modern gas turbines from gas streams containing the products of coal combustion. A pilot plant has been constructed in Kennebunk, Maine to provide proof of concept and evaluation of system components. Tests using pulverized Western Pennsylvania bituminous

coal have been carried out since April, 1995. The ceramic air heater extracts energy from the products of coal combustion to power a gas turbine. This air heater has operated at gas inlet temperatures over 1,095 C and pressures over 7.0 atm without damage to the ceramic tube string components. Stable gas turbine operation has been achieved with energy input from the air heater and a supplementary gas fired combustor. Efforts are underway to fire the cycle on coal only, and to

increase the duration of the test runs. Air heater improvements are being implemented and evaluated. These improvements include installation of a second pass of ceramic tubes and evaluation of corrosion resistant coatings on the ceramic tubes.

This title provides a reference on technical and economic factors of combined-cycle applications within the utility and cogeneration markets. Kehlhofer - and hos co-authors give the reader tips on system layout, details on

controls and automation, and operating instructions.
United States-Mexican Border Environment
Thermal Design & Testing
The Development of the Power Generation Gas Turbine at BBC - ABB - Alstom
Advanced Technologies for Gas Turbines
Commercial Aircraft Propulsion and Energy Systems Research
High Efficiency, Low Emission, Fuel Flexible Power Generation
The second edition of this book includes the most up-

to-date details on the advantages of Nuclear Air-Brayton Power Plant Cycles for advanced reactors. It demonstrates significant advantages for typical sodium cooled reactors and describes how these advantages will grow as higher temperature systems (molten salts) are developed. It also describes how a Nuclear Air-Brayton system can be integrated with significant renewable (solar and wind) energy systems to build a low carbon grid. Starting with basic principles of

thermodynamics as applied to power plant systems, it moves on to describe several types of Nuclear Air-Brayton systems that can be employed to meet different requirements. It provides estimates of component sizes and performance criteria for Small Modular Reactors (SMR). This book has been revised to include updated tables and significant new results that have become available for intercooled systems in the time since the previous edition published. In this edition also, the steam tables

have been updated and Chapters 9 and 10 have been rewritten to keep up with the most up-to- date technology and current research.

Advances in Steam Turbines for Modern Power Plants

Wind power and photovoltaic energy play a significant role in sustainable energy systems. However, these two renewable energy sources do not generate electrical energy on demand and are subject to natural fluctuations. Thus, the need for compensatory measures

arises. Compressed air energy storage power plants (CAES) are a possible solution to providing negative and positive control energy in the electric grid. However, in contrast to other energy storage devices such as pumped hydro energy storage or batteries, the storage medium compressed air hardly contains any energy (or more precisely: enthalpy). Yet, compressed air storage allows the operation of highly efficient gas turbines, which are not only

particularly fast available but also achieve better efficiency than combined cycle power plants used today, as illustrated by the example of the modern gas and steam power plant Irsching with ηtc = 60%from 2011 compared to the 20 years older McIntosh CAES with ηtc = 82.4 %. In this thesis, the calculation methods for the thermodynamics of the CAES process are presented and validated by measured data from the operations of the CAES power plant Huntorf. Both the steady state and

the dynamic (time-dependent) analyses of the process take place. The characteristic value efficiency is discussed in detail, since numerous different interpretations for CAES exist in the literature. A new calculation method for the electric energy storage efficiency is presented, and a method for the calculation of an economically equivalent electricity storage efficiency is developed. Consideration is given to the transformation of the CAES process into a

hydrogen-driven and, thus, greenhouse gas-free process. Finally, a model CAES system is tested in a 100 % renewable model environment. Consequently, it can be stated that in the steady-state thermodynamic calculation in particular, the consideration of realistic isentropic efficiencies of compressors and turbines is essential to correctly estimate the characteristic values of the process. Furthermore, a steadystate view should always be accompanied by dynamic considerations,

since some process characteristics are always time-dependent. The simulation shows that by mapping transient operating conditions, the overall efficiency of the system must be corrected downwards. Nevertheless, in the model environment of a 100 % renewable energy system, it has been shown that a CAES is a useful addition that can provide long-term energy storage.

This book presents current research in the area of gas turbines for different applications. It is a

highly useful book providing a variety of topics ranging from basic understanding about the materials and coatings selection, designing and modeling of gas turbines to advanced technologies for their ever increasing efficiency, which is the need of the hour for modern gas turbine industries. The target audience for this book is material scientists, gas turbine engine design and maintenance engineers, manufacturers, mechanical engineers, undergraduate, post graduate students and

academic researchers. The design and maintenance engineers in aerospace and gas turbine industry will benefit from the contents and discussions in this book.This book presents current research in the area of gas turbines for different applications. It is a highly useful book providing a variety of topics ranging from basic understanding about the materials and coatings selection, designing and modeling of gas turbines to advanced technologies for their ever increasing efficiency, which is the

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Integrated Gasification Combined Cycle (IGCC) Technologies

Operating Experience and Future Potential
Heat Recovery Steam Generators
The Control of Boilers and HRSG Systems
An Innovative Design Approach
Modern Gas Turbine Systems
Everything you wanted to know about industrial gas turbines for electric power generation in one source with hard-to-find, hands-on technical information.
This handbook surveys the range of methods and fuel types used in generating energy for industry, transportation, and heating and cooling of buildings.

Solar, wind, biomass, nuclear, geothermal, ocean and fossil fuels are discussed and compared, and the thermodynamics of energy conversion is explained. Appendices are provided with fully updated data. Thoroughly revised, this second edition surveys the latest advances in energy conversion from a wide variety of currently available energy sources. It describes energy sources such as fossil fuels, biomass (including refuse-derived biomass fuels), nuclear, solar radiation, wind, geothermal, and ocean, then provides the terminology and units used

for each energy resource and their equivalence. It includes an overview of the steam power cycles, gas turbines, internal combustion engines, hydraulic turbines, Stirling engines, advanced fossil fuel power systems, and combined-cycle power plants. It outlines the development, current use, and future of nuclear power.

Covering basic theory, components, installation, maintenance, manufacturing, regulation and industry developments, Gas Turbines: A Handbook of Air, Sea and Land Applications is a broad-based introductory reference designed to give you the

knowledge needed to succeed in the gas turbine industry, land, sea and air applications. Providing the big picture view that other detailed, data-focused resources lack, this book has a strong focus on the information needed to effectively decision-make and plan gas turbine system use for particular applications, taking into consideration not only operational requirements but long-term life-cycle costs in upkeep, repair and future use. With concise, easily digestible overviews of all important theoretical bases and a practical focus throughout, Gas Turbines is

an ideal handbook for those new to the field or in the early stages of their career, as well as more experienced engineers looking for a reliable, one-stop reference that covers the breadth of the field. Covers installation, maintenance, manufacturer's specifications, performance criteria and future trends, offering a rounded view of the area that takes in technical detail as well as well as industry economics and outlook Updated with the latest industry developments, including new emission and efficiency regulations and their impact on gas turbine technology

Over 300 pages of new/revised content, including new sections on microturbines, non-conventional fuel sources for microturbines, emissions, major developments in aircraft engines, use of coal gas and superheated steam, and new case histories throughout highlighting component improvements in all systems and sub-systems.
The Externally-Fired Combined Cycle (EFCC) offers a method for operating high-efficiency gas and steam turbine combined cycles on coal. In the EFCC, an air heater replaces the gas turbine combustor so that

the turbine can be indirectly fired. Ceramic materials are required for the heat exchange surfaces to accommodate the operating temperatures of modern gas turbines. The ceramic air heater or heat exchanger is the focus of this program, and the two primary objectives are (1) to demonstrate that a ceramic air heater can be reliably pressurized to a level of 225 psia (1.5 MPa); and (2) to show that the air heater can withstand exposure to the products of coal combustion at elevated temperatures. By replacing the gas turbine combustor with a ceramic air heater,

the cycle can use coal or other ash-bearing fuels. Numerous programs have attempted to fuel high efficiency gas turbines directly with coal, often resulting in significant ash deposition upon turbine components and corrosion or erosion of turbine blades. This report will show that a ceramic air heater is significantly less susceptible to ash deposition or corrosion than a gas turbine when protected by rudimentary methods of gas-stream clean-up. A 25 [times] 10[sup 6] Btu/hr (7 MW) test facility is under construction in Kennebunk, Maine. It is anticipated

that this proof of concept program will lead to commercialization of the EFCC by electric utility and industrial organizations. Applications are being pursued for power plants ranging from 10 to 100 megawatts.

Technology for a Sustainable Future

Steady State and Time Dependent Compressed Air Energy Storage Model Validated with Huntorf Operational Data and Investigation of Hydrogen Options for a Sustainable Energy Supply

A Handbook of Air, Land and Sea Applications

Dictionary of Environmental

Science and Technology

Power Plant Equipment Operation and Maintenance Guide

Reducing Global Carbon Emissions

Leadership in gas turbine technologies is of continuing importance as the value of gas turbine production is projected to grow substantially by 2030 and beyond. Power generation, aviation, and the oil and gas industries rely on advanced technologies for gas turbines. Market trends including world demographics, energy security and resilience, decarbonization, and customer profiles are

rapidly changing and influencing the future of these industries and gas turbine technologies. Technology trends that define the technological environment in which gas turbine research and development will take place are also changing - including inexpensive, large scale computational capabilities, highly autonomous systems, additive manufacturing, and cybersecurity. It is important to evaluate how these changes influence the gas turbine industry and how to manage these changes moving forward. Advanced Technologies for Gas

Turbines identifies high-priority opportunities for improving and creating advanced technologies that can be introduced into the design and manufacture of gas turbines to enhance their performance. The goals of this report are to assess the 2030 gas turbine global landscape via analysis of global leadership, market trends, and technology trends that impact gas turbine applications, develop a prioritization process, define high-priority research goals, identify high-priority research areas and topics to achieve the specified goals, and direct future research. Findings

and recommendations from this report are important in guiding research within the gas turbine industry and advancing electrical power generation, commercial and military aviation, and oil and gas production.

Industrial Gas Turbines: Performance and Operability explains important aspects of gas turbine performance such as performance deterioration, service life and engine emissions. Traditionally, gas turbine performance has been taught from a design perspective with insufficient attention paid to the

operational issues of a specific site. Operators are not always sufficiently familiar with engine performance issues to resolve operational problems and optimise performance. Industrial Gas Turbines: Performance and Operability discusses the key factors determining the performance of compressors, turbines, combustion and engine controls. An accompanying engine simulator CD illustrates gas turbine performance from the perspective of the operator, building on the concepts discussed in the text. The simulator is effectively a virtual

engine and can be subjected to operating conditions that would be dangerous and damaging to an engine in real-life conditions. It also deals with issues of engine deterioration, emissions and turbine life. The combined use of text and simulators is designed to allow the reader to better understand and optimise gas turbine operation. Discusses the key factors in determining the perfomance of compressors, turbines, combustion and engine controls Explains important aspects of gas and turbine perfomance such as service life and engine emissions Accompanied by CD

illustrating gas turbine performance, building on the concepts discussed in the text Integrated Gasification Combined Cycle (IGCC) Technologies discusses this innovative power generation technology that combines modern coal gasification technology with both gas turbine and steam turbine power generation, an important emerging technology which has the potential to significantly improve the efficiencies and emissions of coal power plants. The advantages of this technology over conventional pulverized coal power plants

include fuel flexibility, greater efficiencies, and very low pollutant emissions. The book reviews the current status and future developments of key technologies involved in IGCC plants and how they can be integrated to maximize efficiency and reduce the cost of electricity generation in a carbon-constrained world. The first part of this book introduces the principles of IGCC systems and the fuel types for use in IGCC systems. The second part covers syngas production within IGCC systems. The third part looks at syngas cleaning, the separation

of CO_2 and hydrogen enrichment, with final sections describing the gas turbine combined cycle and presenting several case studies of existing IGCC plants. Provides an in-depth, multi-contributor overview of integrated gasification combined cycle technologies Reviews the current status and future developments of key technologies involved in IGCC plants Provides several case studies of existing IGCC plants around the world

Primarily this book describes the thermodynamics of gas turbine cycles. The search for

high gas turbine efficiency has produced many variations on the simple "open circuit" plant, involving the use of heat exchangers, reheating and intercooling, water and steam injection, cogeneration and combined cycle plants. These are described fully in the text. A review of recent proposals for a number of novel gas turbine cycles is also included. In the past few years work has been directed towards developing gas turbines which produce less carbon dioxide, or plants from which the CO2 can be disposed of; the implications of a carbon tax on electricity pricing are

considered. In presenting this wide survey of gas turbine cycles for power generation the author calls on both his academic experience (at Cambridge and Liverpool Universities, the Gas Turbine Laboratory at MIT and Penn State University) and his industrial work (primarily with Rolls Royce, plc.) The book will be essential reading for final year and masters students in mechanical engineering, and for practising engineers.

Stability and Control

A Brief Review of Power Generation Thermodynamics

Encyclopedia of Chemical

Processing and Design
Modern Dynamic Reliability Analysis for Multi-state Systems
Volume 10 - Coking to Computer
Combined Cycle Driven Efficiency for Next Generation Nuclear Power Plants
Combined Heat and Power Generation is a concise, up-to-date and accessible guide to the combined delivery of heat and power to anything, from a single home to a municipal power plant. Breeze discusses the historical background for CHP and why it is set to be a key emission control strategy for the 21st Century. Various technologies such as

piston engines, gas turbines and fuel cells are discussed. Economic and environmental factors also are considered and analyzed, making this a very valuable resource for those involved with the research, design, implementation and management of the provision of heat and power. Discusses the historical background of combined heat and power usage and why CHP is seen as a key emission control strategy for the 21st Century Explores the technological aspects of CHP in a clear and concise style and delves into various key technologies, such as piston engines, steam and gas turbines and fuel cells Evaluates the economic factors of CHP and the

installation of generation systems, along with energy conversion efficiencies

The primary human activities that release carbon dioxide (CO2) into the atmosphere are the combustion of fossil fuels (coal, natural gas, and oil) to generate electricity, the provision of energy for transportation, and as a consequence of some industrial processes. Although aviation CO2 emissions only make up approximately 2.0 to 2.5 percent of total global annual CO2 emissions, research to reduce CO2 emissions is urgent because (1) such reductions may be legislated even as commercial air travel grows, (2) because it takes new technology a

long time to propagate into and through the aviation fleet, and (3) because of the ongoing impact of global CO2 emissions. Commercial Aircraft Propulsion and Energy Systems Research develops a national research agenda for reducing CO2 emissions from commercial aviation. This report focuses on propulsion and energy technologies for reducing carbon emissions from large, commercial aircraft â € " single-aisle and twin-aisle aircraft that carry 100 or more passengers â € "because such aircraft account for more than 90 percent of global emissions from commercial aircraft. Moreover, while smaller aircraft also emit CO2, they make only a minor

contribution to global emissions, and many technologies that reduce CO2 emissions for large aircraft also apply to smaller aircraft. As commercial aviation continues to grow in terms of revenue-passenger miles and cargo ton miles, CO2 emissions are expected to increase. To reduce the contribution of aviation to climate change, it is essential to improve the effectiveness of ongoing efforts to reduce emissions and initiate research into new approaches.
"Written by engineers for engineers (with over 150 International Editorial Advisory Board members),this highly lauded resource provides up-to-the-minute information on the chemical

processes, methods, practices, products, and standards in the chemical, and related, industries. " Presenting the newest approaches to the design and operation of steam turbines, this book also explores modern techniques for refurbishment of aging units. It covers recent engineering breakthroughs and new approaches to transient operating conditions, as well as improved information support for operational personnel. An authoritative guide for power plant engineers, operators, owners and designers on all of these crucial developments, this book fully describes and evaluates the most important new design and

operational improvement opportunities for the full spectrum of today's steam turbines – from the newest and most advanced to the more common existing systems.

Materials, Modeling and Performance

Gas Turbine Combined Cycle Power Plants

Advances in Steam Turbines for Modern Power Plants

Externally Fired Combined Cycle Demonstration

High-pressure Ceramic Air Heater for Indirectly Fired Gas Turbine Applications

Coal-fired High Performance Power Generating System. Final Report

This text deals with advanced energy systems

that are sensitive to the environment, such as combined-cycle power plants. The text analyzes major advanced power generation technologies, and it gives an outlook to the future of power engineering. Among the features of this book are over 50 solved problems, examples included at the end of each chapter, a state-of-the-art analysis of advanced energy and emerging technologies, and full figures, appendices, and references.
Heat recovery steam generators (HRSGs) are an

integral part of any modern combined cycle power plant. These heat exchangers are designed to recover the heat from a gas turbine exhaust and convert this to steam, which drives a turbine and ultimately a second generator. Because the gas turbine operates efficiently at high temperatures and heat is removed down to nearly ambient temperature, the overall efficiency of this complex design exceeds that of conventional Rankine cycle coal-, oil-, or gas-fired systems.

These systems can also be operated in simple or combined cycle, increasing flexibility and response to load dispatch. HRSG can be complex to analyze and also difficult to effectively test and prove their performance. This text covers both theory and testing in practice with examples.
This book covers the design, analysis, and optimization of the cleanest, most efficient fossil fuel-fired electric power generation technology at present and in the foreseeable future.

The book contains a wealth of first principles-based calculation methods comprising key formulae, charts, rules of thumb, and other tools developed by the author over the course of 25+ years spent in the power generation industry. It is focused exclusively on actual power plant systems and actual field and/or rating data providing a comprehensive picture of the gas turbine combined cycle technology from performance and cost perspectives. Material presented in this book is

applicable for research and development studies in academia and government/industry laboratories, as well as practical, day-to-day problems encountered in the industry (including OEMs, consulting engineers and plant operators).
The development of clean, sustainable energy systems is one of the preeminent issues of our time. Most projections indicate that combustion-based energy conversion systems will continue to be the predominant approach for the majority of our energy

usage, and gas turbines will continue to be important combustion-based energy conversion devices for many decades to come, used for aircraft propulsion, ground-based power generation, and mechanical-drive applications. This book compiles the key scientific and technological knowledge associated with gas turbine emissions into a single authoritative source. The book has three sections: the first section reviews major issues with gas turbine

combustion, including design approaches and constraints, within the context of emissions. The second section addresses fundamental issues associated with pollutant formation, modeling, and prediction. The third section features case studies from manufacturers and technology developers, emphasizing the system-level and practical issues that must be addressed in developing different types of gas turbines that emit pollutants at acceptable levels.

Advanced Energy Systems

Proceedings of the International Conference, Asia Energy Vision 2020, Organised by the Indian Member Committee, World Energy Council Under the Institution of Engineers (India), During November 15-17, 1996 at New Delhi

Closed-cycle Gas Turbines

Gas-Turbine Power Generation

Gas Turbine Engineering Handbook

Sustainable Energy Supply in Asia

Gas-Turbine Power Generation is a concise, up-to-date, and readable guide providing an introduction to gas turbine

power generation technology. It includes detailed descriptions of gas fired generation systems, demystifies the functions of gas fired technology, and explores the economic and environmental risk factors Engineers, managers, policymakers and those involved in planning and delivering energy resources will find this reference a valuable guide that will help them establish a reliable power supply as they also account for both social and economic objectives. Provides a concise, up-to-date, and

readable guide on gas turbine power generation technology Focuses on the evolution of gas-fired power generation using gas turbines Evaluates the economic and environmental viability of the system with concise diagrams and accessible explanations Process Plant Machinery provides the mechanical, chemical or plant engineer with the information needed to choose equipment best suited for a particular process, to determine optimum efficiency, and to conduct basic troubleshooting and maintenance procedures.

Process Plant Machinery is a unique single-source reference for engineers, managers and technical personnel who need to acquire an understanding of the machinery used in modern process plants: prime movers and power transmission machines; pumping equipment; gas compression machinery; and mixing, conveying, and separation equipment. Starting with an overview of each class, the book quickly leads the reader through practical applications and size considerations into profusely illustrated

component descriptions. Where necessary, standard theory is expertly explained in shortcut formulas and graphs. Maintainability and vulnerability concerns are dealt with as well. Fully updated with all new equipment available Comprehensive Coverage Multi-industry relevance
This revised third edition of Power Generation Technologies explores even more renewable technologies in detail, from traditional fossil fuels and the more established alternatives such as wind and solar power, to emerging

renewables such as biomass and geothermal energy. The book also features new expanded chapters on tidal project proposals, tidal bunds, enhanced geothermal technology, fast-moving areas in marine energy and the development of floating wind turbines. Power Generation Technologies is more than just an account of the technologies – for each method the author explores the economic and environmental costs and risk factors. Each technology is covered using the same basic criteria, so that comparisons between technologies can be

made more easily. Those who are involved in planning and delivering energy, including engineers, managers and policy makers, will find a guide through the minefield of maintaining a reliable power supply, meeting targets on greenhouse gas emissions, and addressing economic and social objectives in this book. Explains in hundreds of diagrams how each technology functions in practice Evaluates the economic and environmental viability of each power generation system covered Features fast-advancing

renewable and alternative power sources, such as municipal waste and solar options Applies a fresh focus on the evolution of traditional technologies such as natural gas and 'clean coal'
Modern gas turbine power plants represent one of the most efficient and economic conventional power generation technologies suitable for large-scale and smaller scale applications. Alongside this, gas turbine systems operate with low emissions and are more flexible in their operational characteristics than other

large-scale generation units such as steam cycle plants. Gas turbines are unrivalled in their superior power density (power-to-weight) and are thus the prime choice for industrial applications where size and weight matter the most. Developments in the field look to improve on this performance, aiming at higher efficiency generation, lower emission systems and more fuel-flexible operation to utilise lower-grade gases, liquid fuels, and gasified solid fuels/biomass. Modern gas turbine systems provides a comprehensive review of gas

turbine science and engineering. The first part of the book provides an overview of gas turbine types, applications and cycles. Part two moves on to explore major components of modern gas turbine systems including compressors, combustors and turbogenerators. Finally, the operation and maintenance of modern gas turbine systems is discussed in part three. The section includes chapters on performance issues and modelling, the maintenance and repair of components and fuel flexibility. Modern gas turbine systems is a technical

resource for power plant operators, industrial engineers working with gas turbine power plants and researchers, scientists and students interested in the field. Provides a comprehensive review of gas turbine systems and fundamentals of a cycle Examines the major components of modern systems, including compressors, combustors and turbines Discusses the operation and maintenance of component parts

Power-plant Control and Instrumentation

Energy, Society, and

Environment
Gas Turbine Powerhouse
Advances in Gas Turbine Technology
Gas Turbines
Energy Conversion

Intended as a practical guide to the design, installation, operation and maintenance of the systems used for measuring and controlling boilers and heat-recovery steam-generators used in land and marine power plants and in process industries.

As a result of the investigations carried out during Phase 1 of the Engineering Development of Coal-Fired High-Performance Power Generation Systems (Combustion 2000), the UTRC-led Combustion

2000 Team is recommending the development of an advanced high performance power generation system (HIPPS) whose high efficiency and minimal pollutant emissions will enable the US to use its abundant coal resources to satisfy current and future demand for electric power. The high efficiency of the power plant, which is the key to minimizing the environmental impact of coal, can only be achieved using a modern gas turbine system. Minimization of emissions can be achieved by combustor design, and advanced air pollution control devices. The commercial plant design described herein is a combined cycle using either a frame-type gas turbine or

an intercooled aeroderivative with clean air as the working fluid. The air is heated by a coal-fired high temperature advanced furnace (HITAF). The best performance from the cycle is achieved by using a modern aeroderivative gas turbine, such as the intercooled FT4000. A simplified schematic is shown. In the UTRC HIPPS, the conversion efficiency for the heavy frame gas turbine version will be 47.4% (HHV) compared to the approximately 35% that is achieved in conventional coal-fired plants. This cycle is based on a gas turbine operating at turbine inlet temperatures approaching 2,500 F. Using an aeroderivative type gas turbine, efficiencies of over 49%

could be realized in advanced cycle configuration (Humid Air Turbine, or HAT). Performance of these power plants is given in a table.

Examines the potential and limits of technical solutions to environmental problems.

Gas turbine engines will still represent a key technology in the next 20-year energy scenarios, either in stand-alone applications or in combination with other power generation equipment. This book intends in fact to provide an updated picture as well as a perspective vision of some of the major improvements that characterize the gas turbine technology in different

applications, from marine and aircraft propulsion to industrial and stationary power generation. Therefore, the target audience for it involves design, analyst, materials and maintenance engineers. Also manufacturers, researchers and scientists will benefit from the timely and accurate information provided in this volume. The book is organized into five main sections including 21 chapters overall: (I) Aero and Marine Gas Turbines, (II) Gas Turbine Systems, (III) Heat Transfer, (IV) Combustion and (V) Materials and Fabrication.
Power Generation Technologies
Process Plant Machinery
Industrial Gas Turbines

Combined-cycle Gas & Steam Turbine Power Plants

Stochastic Processes and the Lz-Transform

Gas Turbine Emissions

THE DEFINITIVE GUIDE TO SELECTING, OPERATING, AND MAINTAINING POWER PLANT EQUIPMENT Power Plant Equipment Operation and Maintenance Guide provides detailed coverage of different types of power plants such as modern co-generation, combined-cycle, and integrated gasification combined cycle (IGCC) plants. The book describes the design, selection, operation, maintenance, and economics of all these power plants. The best available power enhancement options are discussed, including duct burners,

evaporative cooling, inlet-air chilling, absorption chilling, steam and water injection, and peak firing. This in-depth resource addresses the sizing, selection, calculations, operation, diagnostic testing, troubleshooting, maintenance, and refurbishment of all power plant equipment, including steam turbines, steam generators, boilers, condensers, heat exchangers, gas turbines, compressors, pumps, advanced sealing mechanisms, magnetic bearings, and advanced generators. Coverage includes: Methods for enhancing the reliability and maintainability of all power plants Economic analysis of modern co-generation and combined-cycle plants Selection of the best emission-reduction method for power plants Preventive and predictive

maintenance required for power plants
Gas turbine applications in power plants, protective systems, and tests
Advanced Gas Turbine Cycles