Heavy Duty Gas Turbine Operating And Maintenance

BLACKBURN LAM

Development of a Low NOx Medium-Sized Industrial Gas Turbine Operating on Hydrogen-Rich Renewable and Opportunity Fuels Heavy Duty Gas Turbine Operating and Maintenance ConsiderationsIndustrial Gas TurbinesPerformance and Operability
The Federal Government of Nigeria has adopted an ambitious strategy to make Nigeria the world's 20th largest economy by 2020. Sustaining such a pace of growth will entail rapid expansion of the level of activity in key carbon-emitting sectors, such as power, oil and gas, agriculture and transport. In the absence of policies to accompany economic growth with a reduced carbon foot-print, emissions of greenhouse gases could more than double in the next two decades. This study finds that there are several options for Nigeria to achieve the development objectives of vision 20:2020 and beyond, but stabilizing emissions at 2010 levels, and with domestic benefits in the order of 2 percent of GDP. These benefits include cheaper and more diversified electricity sources; more efficient operation of the oil and gas industry; more productive and climate –resilient agriculture; and better transport services, resulting in fuel economies, better air quality, and reduced congestion. The study outlines several actions that the Federal Government could undertake to facilitate the transition towards a low carbon economy, including enhanced governance for climate action, integration of climate consideration in the Agriculture Transformation Agenda, promotion of energy efficiency programs, scale-up of low carbon technologies in power generation (such as renewables an combined cycle gas turbines), and enhance vehicle fuel efficiency.

Gas Turbine Engineering Handbook Elsevier
Current fleets of conventional and nuclear power plants face increasing hostile environmental conditions due to increasingly high temperature operation for improved capacity and efficiency, and the need for long term service. Additional challenges are presented by the requirement to cycle plants to meet peak-load operation. This book presents a comprehensive review of structural materials in conventional and nuclear energy applications. Opening chapters address operational challenges and structural alloy requirements in different types of power plants. The following sections review power plant structural alloys and methods to mitigate critical materials degradation in power plants.

The Gas Turbine Handbook Amer Society of Mechanical
Lean premixed combustion systems have been established as state-of-the-art technology for heavy-duty gas turbines, allowing for low pollutant emissions. However, lean premixed combustion is also associated with thermoacoustic instabilities. Thus, modeling of the key performance parameters - pollutant emissions and thermoacoustics - has become mandatory in the design process. The present thesis contributes to the modeling of those key parameters. The objective was to describe and validate the methods for the prediction of emissions (NO_xand CO) and thermoacoustics. A low order approach for prediction of NO_xemissions and a high fidelity CFD-based approach for the combined prediction of emissions and thermoacoustics are presented within this work. The methods are selected and developed based on analysis of the current state of the art.

A Renewable Source of Energy CRC Press
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

Thermal Power Plant Performance Analysis Walter de Gruyter
The analysis of the reliability and availability of power plants is frequently based on simple indexes that do not take into account the criticality of some failures used for availability analysis. This criticality should be evaluated based on concepts of reliability which consider the effect of a component failure on the performance of the entire plant. System reliability analysis tools provide a root-cause analysis leading to the improvement of the plant maintenance plan. Taking in view that the power plant performance can be evaluated not only based on thermodynamic related indexes, such as heat-rate, Thermal Power Plant Performance Analysis focuses on the presentation of reliability-based tools used to define performance of complex systems and introduces the basic concepts of reliability, maintainability and risk analysis aiming at their application as tools for power plant performance improvement, including: · selection of critical equipment and components, · definition of maintenance plans, mainly for auxiliary systems, and · execution of decision analysis based on risk concepts. The comprehensive presentation of each analysis allows future application of the methodology making Thermal Power Plant Performance Analysis a key resource for undergraduate and postgraduate students in mechanical and nuclear engineering.

A Manufacturer's Role in Heavy-duty Gas Turbine Future Technology Elsevier
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.

Low-Carbon Development World Bank Publications
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

Study and Program Plan for Improved Heavy Duty Gas Turbine Engine Ceramic Component Development Elsevier

There is an increasing industry interest in integrated gas turbine combined cycle plants in which coal gasifiers provide the fuel for the gas turbines. Some gasifier plant designs, including the air-blown processes, some integrated oxygen blown processes and some oxygen-blown processes followed by heavy moisturization, produce fuel gases which have lower heating values ranging from 130 to below 100 BTU/scf for which there is little gas turbine combustion experience. This program has the objectives to: Parametrically determine the effects of moisture, nitrogen and carbon dioxide as diluents so that the combustion characteristics of many varieties of gasification product gases can be reasonably predicted without physically testing each specific gas composition; determine emissions characteristics including NO[sub x], CO, levels etc. associated with each of the diluents; operate with two syngas compositions; DOE chosen air-blown and integrated oxygen-blown, to confirm that the combustion characteristics are in line with predictions; determine if logical'' refinements to the fuel nozzle will yield improved performance for LBTU fuels; determine the conversion rate of ammonia to NO[sub x]; determine the effects of methane inclusion in the fuel.

Transfer Function of Heavy Duty Gas Turbine Combustor Components Elsevier

Contains eight papers from a June 2000 symposium held in Seattle, Washington, reporting on research related to the lubrication requirements of turbines used for power generation. Papers reflect two general trends in the field: the production of more stable lubricants, and the development of improved

A Symposium Presented at the Seventy-fifth Annual Meeting, American Society for Testing and Materials Springer

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.

John Wiley & Sons

This comprehensive, best-selling reference provides the fundamental information you'll need to understand both the operation and proper application of all types of gas turbines. The full spectrum of hardware, as well as typical application scenarios are fully explored, along with operating parameters, controls, inlet treatments, inspection, troubleshooting, and more. The second edition adds a new chapter on gas turbine noise control, as well as an expanded section on use of inlet cooling for power augmentation and NOx control. The author has provided many helpful tips that will enable diagnosis of problems in their early stages and analysis of failures to prevent their recurrence. Also treated are the effects of the external environment on gas turbine operation and life, as well as the impact of the gas turbine on its surrounding environment.

Installation and Maintenance Cambridge University Press

Operation, Maintenance, and Repair of Land-Based Gas Turbines provides a toolkit for practitioners seeking to make technoeconomic decisions on life extension of power turbine equipment. The work describes essential degradation modes affecting critical components and proven methods of restoration. Sections discuss key elements of life extensions for aging units and components, together with critical reviews of available methodologies. Coverage includes advanced nondestructive testing methods essential for effective life extension programs, including lessons learned from firsthand experience working with multiple machine designs, classes and operating conditions. The final sections cover a body of solutions intended to refocus ORM processes on overcoming the shortfalls caused by volatilities and system restructuring. Reviews best practices for practitioners seeking to make decisions on gas turbine maintenance, repair and operations Analyzes components and major sections in terms of functionality, critical features, residual properties and service caused damages Explains the applicability and limitations of special processes and advanced non-destructive testing methods

Opportunities for Nigeria The Fairmont Press, Inc.

This revised edition provides understanding of the basic physical, chemical, and aerodynamic processes associated with gas turbine combustion and their relevance and application to combustor performance and design. It also introduces the many new concepts for ultra-low emissions combustors, and new advances in fuel preparation and liner wall-cooling techniques for their success. It details advanced and practical approaches to combustor design for the clean burning of alternative liquid fuels derived from oil shades, tar sands, and coal. Additional topics include diffusers, combustion performance fuel injection, combustion noise, heat transfer, and emissions.

GAS Turbine Combustion, Second Edition Elsevier

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.

The Industrial Gas Turbine CRC Press

Gas turbine is a type of continuous combustion, internal combustion engine. The main elements that are common to all gas turbine engines are an upstream rotating gas compressor, a combustor and a downstream turbine on the same shaft as the compressor. Some of the most common types of gas turbines are jet engines, turboprop engines, aeroderivative gas turbines and industrial gas turbines. Gas turbine engineering deals with the design, selection, maintenance and operation of gas turbines. It studies the underlying principles of gas turbine operations as well as the economic considerations and implications of operating these machines. The topics included in this book on gas turbine engineering are of utmost significance and bound to provide incredible insights to readers. It is an upcoming field of science that has undergone rapid development over the past few decades. Those in search of information to further their knowledge will be greatly assisted by this book.

3000 to 4500 HP Elsevier

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

Nuclear Energy for Hydrogen Generation through Intermediate Heat Exchangers ASTM International

This book will appeal to a broad range of engineers and managers in all sectors of manufacturing engineering, power generation and transport. Drawing on their specialist experience and knowledge, the many contributors show how the careful application of correct lubrication can lead to improved productivity, longer plant and equipment life and higher profits. Throughout the emphasis is on showing what lubricants can do, and how they can best be used. After introductory chapters that summarise the basic theory and the general types and properties of lubricants, there follow eleven chapters that cover such specific applications as diesel and petrol engines, hydraulics, compressors, machine tools and cutting oils. The last two chapters discuss the storage and handling of lubricants, and lubrication planning. The majority of the authors and editors, have worked for Esso Petroleum Company Limited and have a unique range of experience in this area. Many of the authors have contrbuted to advances in techniques for imrproved lubrication in their specialist areas.

Combined Cycle Systems for Near-Zero Emission Power Generation The Fairmont Press, Inc.

Combined cycle power plants are one of the most promising ways of improving fossil-fuel and biomass energy production. The combination of a gas and steam turbine working in tandem to produce power makes this type of plant highly efficient and allows for CO2 capture and sequestration before combustion. This book provides a comprehensive review of the design, engineering and operational issues of a range of advanced combined cycle plants. After introductory chapters on basic combined cycle power plant and advanced gas turbine design, the book reviews the main types of combined cycle system. Chapters discuss the technology, efficiency and emissions performance of natural gas-fired combined cycle (NGCC) and integrated gasification combined cycle (IGCC) as well as novel humid air cycle, oxy-combustion turbine cycle systems. The book also reviews pressurised fluidized bed combustion (PFBC), externally fired combined cycle (EFCC), hybrid fuel cell turbine (FC/GT), combined cycle and integrated solar combined cycle (ISCC) systems. The final chapter reviews techno-economic analysis of combined cycle systems. With its distinguished editor and international team of contributors, Combined cycle systems for near-zero emission power generation is a standard reference for both industry practitioners and academic researchers seeking to improve the efficiency and environmental impact of power plants. Provides a comprehensive review of the design, engineering and operational issues of a range of advanced combined cycle plants Introduces basic combined cycle power plant and advanced gas turbine design and reviews the main types of combined cycle systems Discusses the technology, efficiency and emissions performance of natural gas-fired combined cycle (NGCC) systems and integrated gasification combined cycle (IGCC) systems, as well as novel humid air cycle systems and oxy-combustion turbine cycle systems

A Supercharged Heavy Duty Gas Turbine and Steam Cycle as a Propulsion Plant for Naval Auxiliary Ships Routledge

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

Gas Turbine Performance ASTM International

A five-year program plan was generated from the study activities with the objectives of demonstrating a fuel economy of 213 mg/W . h (0.35 lb/hp-hr) brake specific fuel consumption by 1981 through use of ceramic materials, with conformance to current and projected Federal noise and emission standards, and to demonstrate a commercially viable engine. Study results show that increased turbine inlet and regenerator inlet temperatures, through the use of ceramic materials, contribute the greatest amount to achieving fuel economy goals. Further, improved component efficiencies (for the compressor, gasifier turbine, power turbine, and regenerator disks show significant additional gains in fuel economy. Fuel saved in a 500,000-mile engine life, risk levels involved in development, and engine-related life cycle costs for fleets (100 units) of trucks and buses were used as criteria to select work goals for the planned program.

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