

**::: Case study: Experiences with
gas and steam turbine power
plant projects on the Russian
market**

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Gas Turbine Case Study

Lennart Scharnell, Stuart Sabol

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Gas Turbine Case Study:

Comparative Study on Energy Research and Development Performance Darren P. Unger, Howard J.

Herzog, Massachusetts Institute of Technology. Energy Laboratory, 1998 Gas turbines have emerged as a strong force in the generation market Gas and combined cycle power plants dominate current orders from electricity generators Figure A shows a resurgence of growth in this field during the past decade This followed the development of gas turbines in the 1940s their emergence into the peak power market in the 1960s and the gas turbine slump of the late 1970s and 1980s during which almost no gas turbines were ordered in the US This new growth can be explained by the way that R D advancements interacted with other drivers to gas turbine success These other drivers were fuel availability environmental concerns and changing market conditions stemming from electrical restructuring R D was one of the major keys to gas turbine success Technical improvements such as material advancements and cooling innovations helped to increase gas and combined cycle turbine efficiency and make them more competitive in the power generation market Figure B displays a rise of efficiency of gas turbine combined cycle systems Natural gas availability was another force that interacted with technical improvements to advance gas turbines Figure C demonstrates how natural gas prices were high during the same period as the gas turbine slump Prices peaked during the early 1980s due to natural gas deregulation a perceived lack of natural gas reserves and a general trend of rising fuel prices When additional reserves were discovered and the deregulatory process ended natural gas prices returned to a more competitive level and could be relied upon as a generally available commodity driving the gas turbine market Other forces interacting with R D and natural gas availability were environmental concerns and the changing power generation market Environmental concerns began to show their effect during the 1970s with regulations which drove up the costs of both coal and nuclear power plants Changing market conditions hallmarked by electricity restructuring is changing the way that management decisions are being made about turbine orders Lower capital costs and higher efficiencies are now driving demand for additional gas and combined cycle turbines The success of gas turbine power generation can be explained by the interaction of technical R D with gas availability environmental concerns and changing market conditions As a result we can see that R D alone does not ensure success We have developed a series of criteria for evaluating energy R D spending It is important to have a sufficient basic research and technology base upon which to build The military aerospace industry provided this for gas turbines Until the interaction occurs R D can be sustained by niche or alternative markets For gas turbines this included commercial aviation and the peak power market While it is hard to predict the future there needs to be at least a plausible scenario of the interaction of forces that will make the technology attractive to a larger market As the 20th century comes to a close these forces have converged for gas

Practical Dispute Resolution
Lennart Scharnell, Stuart Sabol, 2018-05-09 This case study explores actions of an account manager of an important maintenance agreement and a field service engineer both newly assigned to resolve reliability issues with a set of gas

turbines and a deteriorated relationship with their client The case walks the reader through a logical and practical methodology from collection of data to proposing corrective actions in engineering and account management The case study provides discussions on gas turbine combustion technology combustion air emissions commissioning and performance degradation as background for the exercise A reading assignment is included for understanding Answers to exercises are provided to check comprehension The authors propose using this case study in university study or in industry as an individual or group assignment

Gas Turbines Claire Soares, 2014-10-23 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

Case Studies in Mechanical Engineering Stuart Sabol, 2016-05-17 Using a case study approach this reference tests the reader s ability to apply engineering fundamentals to real world examples and receive constructive feedback *Case Studies in Mechanical Engineering* provides real life examples of the application of engineering fundamentals They relate to real equipment real people and real decisions They influence careers projects companies and governments The cases serve as supplements to fundamental courses in thermodynamics fluid mechanics heat transfer instrumentation economics and statistics The author explains equipment and concepts to solve the problems and suggests relevant assignments to augment the cases Graduate engineers seeking to refresh their career or acquire continuing education will find the studies challenging and rewarding Each case is designed to be accomplished in one week earning up to 15 hours of continuing education credit Each case study provides methods to present an argument work with clients recommend action and develop new business Key features Highlights the economic consequences of engineering designs and decisions Encourages problem solving skills Application of fundamentals to life experiences Ability to practice with real life examples *Case Studies in*

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Shutaro Takeda,Alexander Ryota Keeley,Shunsuke Managi,Thomas Gloria,2023-03-08

Case Studies in Energy Systems

Vincenzo Bianco,Mattia de Rosa,2025-09-01 Case Studies in Energy Systems A Practical Approach to Energy System Design and Analysis demonstrates the application of both fundamental and advanced principles by providing a broad range of case studies examples and models Opening with a clear summary of the foundational theory this book then presents a selection of case studies based on the experience of experts Examples are analyzed in a holistic context considering environmental economic and technological aspects Finally the authors have provided models codes and calculation spreadsheets where appropriate allowing readers to test the tools for themselves Equipping researchers and advanced students for the transition to industry practice this book is a guide to real world problem solving for the energy future Examines a range of case studies across the spectrum of energy systems demonstrating the application of theory to practice Enables the holistic analysis of problems covering environmental economic and technological aspects Equips researchers and industry professionals with the tools and problem solving skills required to meet the challenges of the energy transition

Gas Turbines

Serena Vaughn,2025-03-12 Gas Turbines offers a comprehensive exploration of the science and mechanical engineering behind these powerful engines essential for aircraft propulsion and power generation The book delves into the core principles of thermodynamics and fluid mechanics revealing how these factors influence engine efficiency and design Did you know that gas turbines have constantly evolved since their 20th century inception driven by the need for better performance and lower emissions This book uniquely combines theoretical analysis with practical design considerations emphasizing real world applications The book progresses systematically beginning with fundamental thermodynamic principles and moving through key components like compressors combustors and turbines A significant portion focuses on using computational fluid dynamics CFD and finite element analysis FEA to refine turbine blade designs Ultimately the text explores advanced gas turbine cycles highlighting their potential to improve fuel efficiency and promote sustainable transportation

Gas Turbine

Powerhouse Dietrich Eckardt,2025-05-06 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 and technological leadership based on engineering ingenuity and enduring management Though the original edition of the book was 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 correspondingly the title of this reviewed 3rd edition was adapted in a more general sense 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 based on Prandtl's wing theory the progress in

combustion technology towards extraordinary low emission values and that of axial turbines with special emphasis on early turbine cooling innovations already in the 1930s a stroke of genius of the BBC Baden engineering team 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 In 2017 the book received the prestigious Engineer Historian Award of the ASME American Society of Mechanical Engineers *The Evolution of Small Gas Turbine Aircraft Engines: Powering Innovation Through Time* Pasquale De Marco, 2025-07-24 The Evolution of Small Gas Turbine Aircraft Engines Powering Innovation Through Time provides a comprehensive overview of the history technology and applications of small gas turbine aircraft engines This book is a valuable resource for engineers pilots industry professionals and anyone interested in the fascinating world of aviation technology From the earliest pioneers to the latest advancements this book traces the evolution of small gas turbine aircraft engines exploring the key milestones and technological breakthroughs that have shaped their development It examines the challenges faced by engineers such as the need to balance power efficiency and emissions and discusses the innovative solutions that have been developed to overcome these challenges The book also delves into the global landscape of the gas turbine industry highlighting the major players and their contributions It analyzes the impact of globalization and international collaboration on the development and production of these engines The book also explores the regulatory frameworks and environmental concerns associated with gas turbine engines discussing the efforts to reduce emissions and promote sustainable practices In addition to the technical aspects this book provides insights into the military commercial and industrial applications of small gas turbine aircraft engines It examines their role in powering fighter jets attack helicopters passenger jets and a wide range of industrial and marine applications The book also explores the potential of these engines for future applications such as urban air mobility and distributed power generation Whether you are an experienced professional or a newcomer to the field this book offers a wealth of knowledge and insights into the world of small gas turbine aircraft engines It is a must read for anyone who wants to understand the history technology and future prospects of this transformative technology If you like this book write a review **Gas Turbine Blade Cooling**

Chaitanya D Ghodke, 2018-12-10 Gas turbines play an extremely important role in fulfilling a variety of power needs and are mainly used for power generation and propulsion applications The performance and efficiency of gas turbine engines are to a large extent dependent on turbine rotor inlet temperatures typically the hotter the better In gas turbines the combustion temperature and the fuel efficiency are limited by the heat transfer properties of the turbine blades However in pushing the limits of hot gas temperatures while preventing the melting of blade components in high pressure turbines the use of effective cooling technologies is critical Increasing the turbine inlet temperature also increases heat transferred to the turbine blade and it is possible that the operating temperature could reach far above permissible metal temperature In such

cases insufficient cooling of turbine blades results in excessive thermal stress on the blades causing premature blade failure This may bring hazards to the engine s safe operation Gas Turbine Blade Cooling edited by Dr Chaitanya D Ghodke offers 10 handpicked SAE International s technical papers which identify key aspects of turbine blade cooling and help readers understand how this process can improve the performance of turbine hardware **Fossil Energy Update** ,1978

Progress in Sustainable Energy Technologies: Generating Renewable Energy Ibrahim Dincer,Adnan Midilli,Haydar Kucuk,2014-10-29 This multi disciplinary volume presents information on the state of the art in sustainable energy technologies key to tackling the world s energy challenges and achieving environmentally benign solutions Its unique amalgamation of the latest technical information research findings and examples of successfully applied new developments in the area of sustainable energy will be of keen interest to engineers students practitioners scientists and researchers working with sustainable energy technologies Problem statements projections new concepts models experiments measurements and simulations from not only engineering and science but disciplines as diverse as ecology education economics and information technology are included in order to create a truly holistic vision of the sustainable energy field The contributions feature coverage of topics including solar and wind energy biomass and biofuels waste to energy renewable fuels geothermal and hydrogen power efficiency gains in fossil fuels and energy storage technologies including batteries and fuel cells **Gas Turbines Modeling, Simulation, and Control** Hamid Asgari,XiaoQi Chen,2015-10-16 Gas Turbines Modeling Simulation and Control Using Artificial Neural Networks provides new approaches and novel solutions to the modeling simulation and control of gas turbines GTs using artificial neural networks ANNs After delivering a brief introduction to GT performance and classification the book Outlines important criteria to consi **Efficiency, Performance and Robustness of Gas Turbines** Konstantin Volkov,2012-04-04 A wide range of issues related to analysis of gas turbines and their engineering applications are considered in the book Analytical and experimental methods are employed to identify failures and quantify operating conditions and efficiency of gas turbines Gas turbine engine defect diagnostic and condition monitoring systems operating conditions of open gas turbines reduction of jet mixing noise recovery of exhaust heat from gas turbines appropriate materials and coatings ultra micro gas turbines and applications of gas turbines are discussed The open exchange of scientific results and ideas will hopefully lead to improved reliability of gas turbines **Thermal Power Plant Performance Analysis** Gilberto Francisco Martha de Souza,2012-01-04 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

Generation of Electrical Energy, 7th Edition Gupta B.R.,2017-11 Generation of Electrical Energy is written primarily for the undergraduate students of electrical engineering while also covering the syllabus of AMIE and act as a refresher for the professionals in the field The subject itself is now rejuvenated with important new developments With this in view the book covers conventional topics like load curves steam generation hydro generation parallel operation as well as new topics like new sources of energy generation hydrothermal coordination static reserve reliability evaluation among others

The Gas Turbine Handbook Tony Giampaolo,2003 The second edition of a bestseller this comprehensive reference provides the fundamental information required to understand both the operation and proper application of all types of gas turbines The completely updated second edition adds a new section on use of inlet cooling for power augmentation and NOx control It explores the full spectrum of gas turbines hardware typical application scenarios and operating parameters controls inlet treatments inspection trouble shooting and more The author discusses strategies that can help readers avoid problems before they occur and provides tips that enable diagnosis of problems in their early stages and analysis of failures to prevent their recurrence

Business Venture-analysis Case Study Relating to the Manufacture of Gas Turbines for the Generation of Utility Electric Power. Volume II. Private Sector and Public Sector Venture Studies. Final Report. [Use of Coal Gasifier with Combined Gas and Steam System]. ,1978

Increasing national attention is being directed toward the search for clean efficient and reliable energy conversion systems capable of using abundant indigenous fuels such as coal for generation of utility electric power A prime candidate in this area is the combined gas and steam COGAS system employing a high temperature gas turbine with a steam turbine bottoming cycle fed by a coal gasifier This program demonstrates the use of a logical and consistent venture analysis methodology which could also be applied to investigate other high technology energy conversion systems that have yet to reach a state of commercialization but which are of significant interest to the U S Government The venture analysis was performed by using a computer to model the development production sales and in service development phases of programs necessary to introduce new gas turbines in COGAS systems The simulations were produced in terms of estimated cash flows rates of returns and risks which a manufacturer would experience Similar simulations were used to estimate public sector benefits resulting from the lower cost of power and improved environment gained from the use of COGAS systems rather than conventional systems The study shows that substantial social benefits could be realized and private investment would be

made by the gas turbine manufacturers if an infusion of external funds were made during key portions of the gas turbine development program It is shown that there is substantial precedent for such public assistance to make possible economic and environmental benefits that otherwise would not be possible 42 references *Scientific and Technical Aerospace Reports* ,1983 **Case Studies in System of Systems, Enterprise Systems, and Complex Systems Engineering** Alex Gorod,Brian E. White,Vernon Ireland,S. Jimmy Gandhi,Brian Sauser,2014-07-01 Suitable as a reference for industry practitioners and as a textbook for classroom use Case Studies in System of Systems Enterprise Systems and Complex Systems Engineering provides a clear understanding of the principles and practice of system of systems engineering SoSE enterprise systems engineering ESE and complex systems engineering C

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