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***Behandler udviklingen af fly-  
gasturbinemotorer i USA***

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comprehensive information on  
aircraft gas turbine powerplants  
and updated coverage of jet  
engine technology. Extensive***

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Major changes in gas turbine***

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***design, especially in the design and complexity of engine control systems, have led to the need for an up to date, systems-oriented treatment of gas turbine propulsion. Pulling together all of the systems and subsystems***

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***associated with gas turbine engines in aircraft and marine applications, Gas Turbine Propulsion Systems discusses the latest developments in the field. Chapters include aircraft engine systems functional***

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***overview, marine propulsion systems, fuel control and power management systems, engine lubrication and scavenging systems, nacelle and ancillary systems, engine certification, unique engine systems and***

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***future developments in gas turbine propulsion systems. The authors also present examples of specific engines and applications. Written from a wholly practical perspective by two authors with long careers in***

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***the gas turbine & fuel systems industries, Gas Turbine Propulsion Systems provides an excellent resource for project and program managers in the gas turbine engine community, the aircraft OEM community, and***



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Europe and the United States. It  
also offers a useful reference for  
students and researchers in  
aerospace engineering.***

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Emissions  
Requirements for Advancement  
of Technology Gas Turbine  
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Instrumentation***

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***and abroad, and has also become a standard reference for professionals in the aircraft engine industry. Unique in treating the engine as a complete system at increasing levels***

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***of sophistication, it covers  
all types of modern aircraft  
engines, including  
turbojets, turbofans, and  
turboprops, and also  
discusses hypersonic  
propulsion systems of the***

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***future. Performance is described in terms of the fluid dynamic and thermodynamic limits on the behavior of the principal components: inlets, compressors,***

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***combustors, turbines, and  
nozzles. Environmental  
factors such as atmospheric  
pollution and noise are  
treated along with  
performance. This new  
edition has been***

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***substantially revised to include more complete and up-to-date coverage of compressors, turbines, and combustion systems, and to introduce current research directions. The discussion***



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***of high-bypass turbofans  
has been expanded in  
keeping with their great  
commercial importance.  
Propulsion for civil  
supersonic transports is  
taken up in the current***

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***context. The chapter on hypersonic air breathing engines has been expanded to reflect interest in the use of scramjets to power the National Aerospace Plane. The discussion of exhaust***

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***emissions and noise and associated regulatory structures have been updated and there are many corrections and clarifications.***

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***Technology Glencoe/McGraw-  
Hill School Publishing  
Company Aircraft Engines  
and Gas Turbines Mit Press  
The report presents the  
requirements for  
advancement of technology***

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***in the state-of-the-art of  
aircraft gas turbine engine  
monitoring  
instrumentation. The report  
discusses data on causes of  
engine removal for overhaul  
for aircraft gas turbine***

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***engines used by the Navy. It is seen that engine monitoring may result in a substantial increase in average time between overhauls. Advancement of technology requires***

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***realization of the benefits available through engine monitoring. It also requires a scientific determination of the parameters necessary to accurately define engine conditions and studies to***

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***define the extent of inflight  
computation and  
monitoring. Also required is  
accurate turbine inlet gas  
temperature measurement  
up to 3500F, and a hot  
section analysis system***



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***which evaluates material  
fatigue, thermal shock, and  
creep. (Author).***

***German Jet Engine and Gas  
Turbine Development,***

***1930-45***

***Jet Engines***

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***Jet Propulsion  
An Introduction to Systems  
Functions  
Design Principles and  
Methods for Aircraft Gas  
Turbine Engines***

The symposium dealt with

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design approaches for military aircraft propulsion systems to provide enhanced operational flexibility, longer range, better fuel efficiency and improved affordability. All classes of gas turbines were addressed in nine

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sessions as follows: Engine  
Design and Analysis (Part 1) (5  
papers); Mechanical Systems (6  
papers); Controls (4 papers);  
Combustors/Augmentors (4  
papers); Compressor Systems  
(Part I) (5 papers); Compressor

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Systems (Part II) (3 papers);  
Turbines (Part I) (5 papers);  
Turbines (Part II) (4 papers);  
Engine Design and Analysis  
(Part II) (4 papers) These  
proceedings also include a  
Technical Evaluation Report and

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a Keynote address published in French and English.

Annotation A design textbook attempting to bridge the gap between traditional academic textbooks, which emphasize individual concepts and

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principles; and design handbooks, which provide collections of known solutions. The airbreathing gas turbine engine is the example used to teach principles and methods. The first edition appeared in

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1987. The disk contains  
supplemental material.

Annotation c. Book News, Inc.,  
Portland, OR ([booknews.com](http://booknews.com)).

Future aircraft engines must  
provide ultra-low emissions and  
high efficiency at low cost while



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maintaining the reliability and operability of present day engines. The demands for increased performance and decreased emissions have resulted in advanced combustor designs that are critically

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dependent on efficient fuel/air mixing and lean operation.

However, all combustors, but most notably lean-burning low-emissions combustors, are susceptible to combustion instabilities. These instabilities

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are typically caused by the interaction of the fluctuating heat release of the combustion process with naturally occurring acoustic resonances. These interactions can produce large pressure oscillations within the

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combustor and can reduce component life and potentially lead to premature mechanical failures. Active Combustion Control which consists of feedback-based control of the fuel-air mixing process can

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provide an approach to achieving acceptable combustor dynamic behavior while minimizing emissions, and thus can provide flexibility during the combustor design process. The NASA Glenn Active Combustion

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Control Technology activity aims to demonstrate active control in a realistic environment relevant to aircraft engines by providing experiments tied to aircraft gas turbine combustors. The intent is to allow the technology maturity

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of active combustion control to advance to eventual demonstration in an engine environment. Work at NASA Glenn has shown that active combustion control, utilizing advanced algorithms working

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through high frequency fuel actuation, can effectively suppress instabilities in a combustor which emulates the instabilities found in an aircraft gas turbine engine. Current efforts are aimed at extending



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these active control technologies to advanced ultra-low-emissions combustors such as those employing multi-point lean direct injection.

A Tradition of Excellence  
Airframe and Powerplant

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Mechanics Powerplant  
Handbook

Toward a New Generation of  
High-performance Aircraft Gas  
Turbine Engine Controls  
Substitution for Cobalt and  
Chromium in the Aircraft Gas

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Turbine Engine

A Simple Guide to the

Aerodynamic and

Thermodynamic Design and

Performance of Jet Engines

**Aircraft Engines and Gas**

**Turbines is widely used as a**

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**text in the United States and  
abroad, and has also become  
a standard reference for  
professionals in the aircraft  
engine industry. Unique in  
treating the engine as a  
complete system at increasing**

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**levels of sophistication, it covers all types of modern aircraft engines, including turbojets, turbofans, and turboprops, and also discusses hypersonic propulsion systems of the**

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**future. Performance is described in terms of the fluid dynamic and thermodynamic limits on the behavior of the principal components: inlets, compressors, combustors, turbines, and nozzles.**

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**Environmental factors such as atmospheric pollution and noise are treated along with performance. This new edition has been substantially revised to include more complete and up-to-date coverage of**

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**compressors, turbines, and combustion systems, and to introduce current research directions. The discussion of high-bypass turbofans has been expanded in keeping with their great commercial**



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**importance. Propulsion for  
civil supersonic transports is  
taken up in the current  
context. The chapter on  
hypersonic air breathing  
engines has been expanded to  
reflect interest in the use of**

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**scramjets to power the  
National Aerospace Plane. The  
discussion of exhaust  
emissions and noise and  
associated regulatory  
structures have been updated  
and there are many**

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**corrections and  
clarifications. Jack L.  
Kerrebrock is Richard  
Cockburn Maclaurin Professor  
of Aeronautic's and  
Astronautics at the  
Massachusetts Institute of**

*Page 51/160*

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**Technology.**

**This chapter deals with some intensive methods regarding aircraft gas-turbine-engine performance enhancement, which are suitable alternatives for the most common**

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**temporarily thrust increasing  
method-the afterburning.**

**Coolant injection method, into  
the compressor or into the  
combustor, realizes the  
desired thrust increase for a  
short period, when the flight**

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**conditions or other aircraft necessities require this. Both methods were studied from aircraft engine's point of view, considering it as controlled object. New engine's mathematical model was built**

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**up, following the thermo- and gas-dynamics changes and some quality studies were performed, based on engine's time behavior simulations; some control options and schemes were also studied.**

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**Quantitative studies were based on the model of an existing turbo-engine; mathematical model's coefficients are both experimentally determined (in the Aerospace Engineering**



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**Division labs) as well as estimated based on graphic-analytic methods. This approach and the presented methods could be applied to any other turbo-jet engine and used even in the stage of pre-**

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**design of a new engine, to estimate its stability and quality.**

**This text provides an introduction to gas turbine engines and jet propulsion for aerospace or mechanical**

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**engineers. The text is divided into four parts: introduction to aircraft propulsion; basic concepts and one-dimensional/gas dynamics; parametric (design point) and performance (off-design)**

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**analysis of air breathing  
propulsion systems; and  
analysis and design of major  
gas turbine engine  
components (fans,  
compressors, turbines, inlets,  
nozzles, main burners, and**

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afterburners). Design concepts are introduced early (aircraft performance in introductory chapter) and integrated throughout. Written with extensive student input on the design of the book, the

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**book builds upon definitions  
and gradually develops the  
thermodynamics, gas  
dynamics, and gas turbine  
engine principles.**

**Aircraft Engine Design  
Gas Turbine Emissions**

*Page 62/160*

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**Aircraft Propulsion and Gas  
Turbine Engines**

**Gas Turbine Propulsion  
Systems**

**The History of North American  
Small Gas Turbine Aircraft  
Engines**

*Page 63/160*

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*Prepared at the request of NASA, Aeronautical Technologies for the Twenty-First Century presents steps to help prevent the erosion of U.S. dominance in the global aeronautics market. The book recommends the immediate expansion of research on advanced aircraft that travel at*



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*subsonic speeds and research on designs that will meet expected future demands for supersonic and short-haul aircraft, including helicopters, commuter aircraft, "tiltrotor," and other advanced vehicle designs. These recommendations are intended to*

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*address the needs of improved aircraft performance, greater capacity to handle passengers and cargo, lower cost and increased convenience of air travel, greater aircraft and air traffic management system safety, and reduced environmental impacts.*

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*This paper presents a historical perspective of the advancement of control technologies for aircraft gas turbine engines. The paper primarily covers technology advances in the United States in the last 60 years (1940 to approximately 2002). The paper emphasizes the pioneering*

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*technologies that have been tested or implemented during this period, assimilating knowledge and experience from industry experts, including personal interviews with both current and retired experts. Since the first United States-built aircraft gas turbine engine was flown*

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*in 1942, engine control technology has evolved from a simple hydro-mechanical fuel metering valve to a full-authority digital electronic control system (FADEC) that is common to all modern aircraft propulsion systems. At the same time, control systems have provided engine diagnostic*

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*functions. Engine diagnostic capabilities have also evolved from pilot observation of engine gauges to the automated on-board diagnostic system that uses mathematical models to assess engine health and assist in post-flight troubleshooting and maintenance. Using system*

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*complexity and capability as a measure, we can break the historical development of control systems down to four phases: (1) the start-up phase (1942 to 1949), (2) the growth phase (1950 to 1969), (3) the electronic phase (1970 to 1989), and (4) the integration phase (1990 to 2002). In*

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*each phase, the state-of-the-art control technology is described and the engines that have become historical landmarks, from the control and diagnostic standpoint, are identified. Finally, a historical perspective of engine controls in the last 60 years is presented in terms of*



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*control system complexity, number of sensors, number of lines of software (or embedded code), and other factors. Jaw, Link C.a and Garg, Sanjay Glenn Research*

*Center ELECTRONIC CONTROL;  
ENGINE CONTROL; PROPULSION  
SYSTEM CONFIGURATIONS; GAS*

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*TURBINE ENGINES; PHASE CONTROL;  
MEASURING INSTRUMENTS;  
MATHEMATICAL MODELS;  
MAINTENANCE...*

*This is the second edition of  
Cumpsty's excellent self-contained  
introduction to the aerodynamic and  
thermodynamic design of modern*

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*civil and military jet engines. Through two engine design projects, first for a new large passenger aircraft, and second for a new fighter aircraft, the text introduces, illustrates and explains the important facets of modern engine design. Individual sections cover aircraft requirements*

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*and aerodynamics, principles of gas turbines and jet engines, elementary compressible fluid mechanics, bypass ratio selection, scaling and dimensional analysis, turbine and compressor design and characteristics, design optimization, and off-design performance. The*

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*book emphasises principles and ideas, with simplification and approximation used where this helps understanding. This edition has been thoroughly updated and revised, and includes a new appendix on noise control and an expanded treatment of combustion emissions. Suitable for*

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*student courses in aircraft propulsion, but also an invaluable reference for engineers in the engine and airframe industry.*

*A History of Jet Engine Progress at  
General Electric*

*Department of Defense Procurement  
Management Review: Aircraft Gas*

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*Turbine Engine Acquisition and  
Logistics Support  
Jet Power*

*Aircraft Engines and Gas Turbines  
Propulsion Control Technology  
Development in the United States a  
Historical Perspective*

New edition of the successful

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textbook updated to include new material on UAVs, design guidelines in aircraft engine component systems and additional end of chapter problems Aircraft Propulsion, Second Edition follows the successful first edition textbook with comprehensive treatment of



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the subjects in airbreathing propulsion, from the basic principles to more advanced treatments in engine components and system integration. This new edition has been extensively updated to include a number of new and important topics. A chapter is

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now included on General Aviation and Uninhabited Aerial Vehicle (UAV) Propulsion Systems that includes a discussion on electric and hybrid propulsion. Propeller theory is added to the presentation of turboprop engines. A new section in cycle analysis treats Ultra-

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High Bypass (UHB) and Geared Turbofan engines. New material on drop-in biofuels and design for sustainability is added to reflect the FAA's 2025 Vision. In addition, the design guidelines in aircraft engine components are expanded to make the book user friendly for

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engine designers. Extensive review material and derivations are included to help the reader navigate through the subject with ease. Key features: General Aviation and UAV Propulsion Systems are presented in a new chapter Discusses Ultra-High Bypass and Geared Turbofan

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engines Presents alternative drop-in jet fuels Expands on engine components' design guidelines The end-of-chapter problem sets have been increased by nearly 50% and solutions are available on a companion website Presents a new section on engine performance

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testing and instrumentation  
Includes a new 10-Minute Quiz  
appendix (with 45 quizzes) that can  
be used as a continuous  
assessment and improvement tool  
in teaching/learning propulsion  
principles and concepts Includes a  
new appendix on Rules of Thumb

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and Trends in aircraft propulsion  
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is a must-have textbook for  
graduate and undergraduate  
students, and is also an excellent  
source of information for  
researchers and practitioners in the  
aerospace and power industry.

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This report presents the results of a ten month study effort. The primary purpose of this effort was to: perform a comprehensive review of the policies, procedures and practices used by the Air Force in acquiring and supporting aircraft gas turbine engines; assess the



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current process in terms of its effectiveness in the areas of management, technology, development, acquisition, logistics support, and life cycle costs; and where appropriate, develop recommendations for new or improved policies, procedures and

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practices. A secondary purpose was to review and document the practices used by selected commercial airlines for acquiring and supporting aircraft engines. The scope of the study included all major facets affecting Air Force management of aircraft gas turbine

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engines, from the basic technology, to the stated operational requirement for an engine, through its logistics support in the active inventory.

The primary human activities that release carbon dioxide (CO<sub>2</sub>) into the atmosphere are the combustion

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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 CO<sub>2</sub> emissions only make up approximately 2.0 to 2.5 percent of

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total global annual CO<sub>2</sub> emissions, research to reduce CO<sub>2</sub> 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)

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because of the ongoing impact of global CO<sub>2</sub> emissions. Commercial Aircraft Propulsion and Energy Systems Research develops a national research agenda for reducing CO<sub>2</sub> emissions from commercial aviation. This report focuses on propulsion and energy

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technologies for reducing carbon emissions from large, commercial aircraftâ€" single-aisle and twin-aisle aircraft that carry 100 or more passengersâ€"because such aircraft account for more than 90 percent of global emissions from commercial aircraft. Moreover,

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while smaller aircraft also emit CO<sub>2</sub>, they make only a minor contribution to global emissions, and many technologies that reduce CO<sub>2</sub> emissions for large aircraft also apply to smaller aircraft. As commercial aviation continues to grow in terms of revenue-passenger



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miles and cargo ton miles, CO<sub>2</sub> 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.

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Aerothermodynamics of Gas  
Turbine and Rocket Propulsion  
Aeronautical Technologies for the  
Twenty-First Century  
Aerothermodynamics of Aircraft  
Engine Components  
Gas Turbine Performance

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Annotation Design and R & D engineers and students will value the comprehensive, meticulous coverage in this volume. Beginning with the basic principles and concepts of aeropropulsion combustion,

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chapters explore specific processes, limitations, and analytical methods as they bear on component design.

Now in its third edition, Jet Propulsion offers a self-contained introduction to the

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aerodynamic and thermodynamic design of modern civil and military jet engine design. Through two-engine design projects for a large passenger and a new fighter aircraft, the text

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explains modern engine design. Individual sections cover aircraft requirements, aerodynamics, principles of gas turbines and jet engines, elementary compressible fluid mechanics, bypass ratio

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selection, scaling and dimensional analysis, turbine and compressor design and characteristics, design optimization, and off-design performance. The civil aircraft, which formed the core of Part I

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in the previous editions, has now been in service for several years as the Airbus A380.

Attention in the aircraft industry has now shifted to two-engine aircraft with a greater emphasis on reduction of fuel burn, so the



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model created for Part I in this edition is the new efficient aircraft, a twin aimed at high efficiency.

The development of clean, sustainable energy systems is one of the preeminent issues of

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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

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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

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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,

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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

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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

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at acceptable levels.

Aircraft Propulsion

Commercial Aircraft Gas

Turbine Engines Engine

Compression Technology

Advanced Technologies for Gas

Turbines

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Seven Decades of Progress  
Aircraft Engines and Gas  
Turbines, second edition

*Leadership in gas turbine  
technologies is of  
continuing importance as  
the value of gas turbine*



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*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*

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*turbines. Market trends including world demographics, energy security and resilience, decarbonization, and customer profiles are rapidly changing and*

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*influencing the future of  
these industries and gas  
turbine technologies.*

*Technology trends that  
define the technological  
environment in which gas  
turbine research and*

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*development will take  
place are also changing -  
including inexpensive,  
large scale computational  
capabilities, highly  
autonomous systems,  
additive manufacturing,*

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*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*

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*Gas Turbines identifies high-priority opportunities for improving and creating advanced technologies that can be introduced into the design and manufacture of*

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*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,*

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*and technology trends that  
impact gas turbine  
applications, develop a  
prioritization process,  
define high-priority  
research goals, identify  
high-priority research*



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*areas and topics to  
achieve the specified  
goals, and direct future  
research. Findings and  
recommendations from this  
report are important in  
guiding research within*

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*the gas turbine industry  
and advancing electrical  
power generation,  
commercial and military  
aviation, and oil and gas  
production.*

*This book is intended for*

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*those who wish to broaden their knowledge of jet engine technology and associated subjects. It covers turbojet, turboprop and turbofan designs and is applicable to civilian*

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*and military usage. It commences with an overview of the main design types and fundamentals and then looks at air intakes, compressors, turbines and exhaust systems in great*

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extends the text's  
coverage so that both  
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