Turboshaft Engine

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Temperature Distortion Generator for Turboshaft Engine Testing - 1984

Preliminary Turboshaft Engine Design Methodology for Rotorcraft Applications - Stephen Andrew Suhr 2006
In the development of modern rotorcraft vehicles, many unique challenges emerge due to the highly coupled nature of individual rotorcraft design disciplines therefore, the use of an integrated product and process development (IPPD) methodology is necessary to drive the design solution. Through the use of parallel design and analysis, this approach achieves the design synthesis of numerous product and process requirements that is essential in ultimately satisfying the customers demands. Over the past twenty years, Georgia Techs Center for Excellence in Rotorcraft Technology (CERT) has continuously focused on refining this IPPD approach within its rotorcraft design course by using the annual American Helicopter Society (AHS) Student Design Competition as the design requirement catalyst. Despite this extensive experience, however, the documentation of this preliminary rotorcraft design approach has become out of date or insufficient in addressing a modern IPPD methodology. In no design discipline is this need for updated documentation more prevalent than in propulsion system design, specifically in the area of gas turbine technology. From an academic perspective, the vast majority of current propulsion system design resources are focused on fixed-wing applications with very limited reference to the use of turboshaft engines. Additionally, most rotorcraft design resources are centered on aerodynamic considerations and largely overlook propulsion system integration. This research effort is aimed at bridging this information gap by developing a preliminary turboshaft engine design methodology that is applicable to a wide range of potential rotorcraft propulsion system design problems. The preliminary engine design process begins by defining the design space through analysis of the initial performance and mission requirements dictated in a given request for proposal (RFP). Engine cycle selection is then completed using tools such as GasTurb and the NASA Engine Performance Program (NEPP) to conduct thorough parametric and engine performance analysis. Basic engine component design considerations are highlighted to facilitate configuration trade studies and to generate more detailed engine performance and geometric data. Throughout this approach, a comprehensive engine design case study is incorporated based on a two-place, turbine training helicopter known as the Georgia Tech Generic Helicopter (GTGH). This example serves as a consistent propulsion system design reference highlighting the level of integration and detail required for each step of the preliminary turboshaft engine design methodology.
Army/NASA Small Turboshaft Engine Digital Controls Research Program - J. F. Sellers 1982
A cooperative Army/NASA program to conduct digital controls research for small turboshaft engines is described. The participating agencies are the Army TRL Propulsion Laboratory and NASA Lewis Research Center. The emphasis of the program is on engine test evaluation of advanced control logic using a flexible microprocessor-based digital control system. The engine test facility is an indoor sea-level stand. It includes a 2500-hp eddy-current dynamometer to adsorb engine shaft horsepower. The dynamometer control system provides capability to change the torque vs. speed characteristics of the load, thus permitting various rotor systems to be simulated. Flywheels are used to simulate various rotor moments of inertia. The dynamometer controls are designed to provide full-range load changes in less than 1 second. This provides the capability to evaluate system response to rapid load changes such as those induced by collective or cyclic pitch transients in actual flight. The digital control system usd in this program is designed specifically for research on advanced control logic. Control software is stored in programmable memory. New control algorithms may be stored in a floppy disk and loaded directly into memory. (Author).

Illustrated Parts Catalog - General Motors Corporation. Allison Division 1967

An Evaluation of Engine Performance Assessment Procedures for the Lycoming T53 Engine as Installed in the Iroquois Helicopter - D. E. Glenny 1981
Since the introduction of the Iroquois/Lycoming T53 helicopter into service with the US Forces and its subsequent use by the RAAF, the aircraft and, in particular, its engine have been subject to an exhaustive series of regular in-service tests to determine the installed power available and thus the aircraft performance capabilities. The Lycoming T53-L11/L13 engine, as with most other turboshaft engines, is fitted with a torque indicating system. The torque meter can be used in conjunction with other engine/aircraft instrumentation to assess engine performance on initial installation or during subsequent service life. A synopsis of the many engine performance assessment procedures used by various operators throughout the world is given.
Continental Ts120 Turboshaft Engine. Power Control System. Supplement - CONTINENTAL AVIATION AND ENGINEERING CORP DETROIT MI. 1965
This report presents the design of the power control system for a basic single-spool turboshaft engine and the variations possible with this basic design. These variations cover engines with outputs of 60, 90, and 120 horsepower, recuperated and non-recuperated versions, along with direct drive and geared output speeds. Included are schematic diagrams, description of the fuel control scheduling and governing methods, estimated engine fuel schedules, and a brief discussion of those changes which have been made to the power control system since the submission of the main engine design report. (Author).
Aircraft Propulsion and Gas Turbine Engines - Ahmed F. El-Sayed 2017-07-06
Aircraft Propulsion and Gas Turbine Engines, Second Edition builds upon the success of the book’s first edition, with the addition of three major topic areas: Piston Engines with integrated propeller coverage; Pump Technologies; and Rocket Propulsion. The rocket propulsion section extends the text’s coverage so that both Aerospace and Aeronautical topics can be studied and compared. Numerous updates have been made to reflect the latest advances in turbine engines, fuels, and combustion. The text is now divided into three parts, the first two devoted to air breathing engines, and the third covering non-air breathing or rocket engines.
Preliminary Study of Advanced Turboprop and Turboshaft Engines for Light Aircraft - 1980

A Model for Turboshaft Engine Test Facility Uncertainty Analysis - James A. Kimbel 2007

Forced Response Testing of an Axi-Centrifugal Turboshaft Engine - A. Karl Owen 1996
Dynamic data from tests of a T55-L-712 engine are presented. Engine stall/surge data were analyzed using digital signal processing techniques. In addition, forced response testing (system identification studies) was done at various engine speeds. Forced response testing was done using eight jet ejectors approximately equally circumferentially spaced about the compressor front face. This paper presents some preliminary results for the ground idle (approximately 60% of design speed) point. Brief descriptions of the jet injection system, the test matrix, and analysis techniques used are presented. Results of these analyses indicate a substantial transfer of energy across the compressor first stage at some frequencies and that the ejectors are effective in modifying the local flow conditions in front of the first compressor stage.
Proceedings of the 5th China Aeronautical Science and Technology Conference - Chinese Aeronautical Society 2021-11-02

To sort out the progress of aviation science and technology and industry, look forward to the future development trend, commend scientific and technological innovation achievements and talents, strengthen international cooperation, promote discipline exchanges, encourage scientific and technological innovation, and promote the development of aviation, the Chinese Aeronautical Society holds a China Aviation Science and Technology Conference every two years, which has been successfully held for four times and has become the highest level, largest scale, most influential and authoritative science and technology conference in the field of aviation in China. The 5th China Aviation Science and Technology Conference will be held in Wuzhen, Jiaxing City, Zhejiang Province in 2021, with the theme of "New Generation of Aviation Equipment and Technology", with academician Zhang Yanzhong as the chairman of the conference. This book contains original, peer-reviewed research papers from the conference. The topics covered include but are not limited to navigation, guidance and control technologies, key technologies for aircraft design and overall optimization, aviation test technologies, aviation airborne systems, electromechanical technologies, structural design, aerodynamics and flight mechanics, other related technologies, advanced aviation materials and manufacturing technologies, advanced aviation propulsion technologies, and civil aviation transportation. The papers presented here share the latest discoveries on aviation science and technology, making the book a valuable asset for researchers, engineers, and students.

Performance Development of the Gem Turboshaft Engine - A. B. McKenzie 1975

Simulating a Small Turboshaft Engine in Real-time Multiprocessor Simulator (RTMPS) Environment - 1986

A High Fidelity Real-time Simulation of a Small Turboshaft Engine - Mark G. Ballin 1988

A Brief History of the Jet Engine and Jet Aircraft - Laura H. Cansdell 2022-04-08

One hundred plus years of aviation jet aircraft design and the jet engines that took the inventions to the sky.

Experimental and Analytical Study of Ceramic-coated Turbine-tip Shroud Seals for Small Turbine Engines - 1985

An experimental investigation was conducted to validate component rig results and the analytical model of the behavior of a ceramic material in the operating environment of a small turbine engine. The ceramic shroud has the potential of increasing small turbine-engine efficiency through use of higher gas-path temperatures or less shroud cooling air, of extending component life through reduced metal temperatures, or of reducing component weight. The ceramic shrouds were subjected to 1001 cycles between idle and high power and steady-state conditions for a total of 57.8 engine hr. Posttest engine inspection revealed mud-flat surface cracking, which the authors attributed to microcracking under tension with crack penetration to the ceramic-and bond-coat interface. Sections and micrographs tend to corroborate the thesis. The engine test data provided input to a thermomechanical analysis to predict temperature and stress profiles throughtout the ceramic gas-path seal. The analysis predicts cyclic thermal stresses large enough to cause the seal to fail. These stresses are, however, mitigated by inelastic behavior of the shroud materials and by microfracturing that tensile stresses produce. Microfracturing enhances shroud longevity during early life but provides the failure mechanism during extended life when coupled with time-dependent inelastic materials effects. Keywords: Turboshaft engines, Ground tests, and Ceramic bond.

Model TS 120 Turboshaft Engine Program - TELEDYNE CAE TOLEDO OHIO. 1970

The report, in four (4) volumes, is on the design and development of a simple cycle, fixed shaft turbine engine, designated the TS-120 turboshaft engine. The work performed, including compressor design and test rig development, gas generator hot section design and test rig development, and engine design and development testing is contained in this report. From its inception, the TS-120 engine was intended to be the nucleus of a family of Military Standard turboshaft engines for powering portable electrical generator sets in the range of 30, 60, 90KW. Because of the unavailability of a high speed direct drive alternator, the engine was designed incorporating a reduction gearbox to facilitate engine testing and make use of existing generators. Volume I of this report introduces the program and covers the studies, design, development and tests of the compressor, combustor and turbine and the engine as a whole. Conclusions and recommendations are included. (Author).

Fundamentals of Aircraft and Rocket Propulsion - Ahmed F. El-Sayed 2016-05-25

This book provides a comprehensive basics-to-advanced course in an aero-thermal science vital to the design of engines for either type of craft. The text classifies engines powering aircraft and single/multi-stage rockets, and derives performance parameters for both from basic aerodynamics and thermodynamics laws. Each type of engine is analyzed for optimum performance goals, and mission-appropriate engines selection is explained. Fundamentals of Aircraft and Rocket Propulsion provides information about and analyses of: thermodynamic cycles of shaft engines (piston, turboprop, turboshaft and propfan); jet engines (pulsejet, pulse detonation engine, ramjet, scramjet, turbojet and turbofan); chemical and non-chemical rocket engines; conceptual design of modular rocket engines (combustor, nozzle and turbopumps); and conceptual design of different modules of aero-engines in their design and off-design state. Aimed at graduate and final-year undergraduate students, this textbook provides a thorough grounding in the history and classification of both aircraft and rocket engines, important design features of all the engines detailed, and particular consideration of special aircraft such as unmanned aerial and short/vertical takeoff and landing aircraft. End-of-chapter exercises make this a valuable student resource, and the provision of a downloadable solutions manual will be of further benefit for course instructors.

Air Breathing Engines - Zoeb Husain 2010-02

Examines the theory of air breathing engines - or more precisely aircraft engines. These engines take air from the atmosphere, accelerate and produce thrust to the aircraft. Gas turbine forms the basic unit and is gas generator. The components of the gas turbines are given in detail. The book will be useful for aeronautical engineering students.

Federal Register - 2014

CONTINENTAL TS120 TURBOSHAFT ENGINE. - R. Smith 1965

This report presents the design of a basic single-spool turboshaft engine and the variations possible with this basic design. These variations cover engines with outputs of 60, 90, and 120 horsepower, recuperated and non-recuperated versions, along with direct drive and geared output speeds. The engine accessories include a starter, battery charging alternator, fuel control and integral lubrication system. The engine feature rapid replacement of static hot parts and turbine inspection. The report includes a complete analytical design analysis of the aerothermodynamic components, performance, rotating elements, static structure, accessory drives, reduction gearing and miscellaneous parts of the engine. (Author).

The Development of a T53-L11 Engine Computer Model - J. Faragher 1989

This Technical Memorandum describes the development of a steady-state engine model for a Lycoming T53 turboshaft engine. A genuine compressor map obtained from Lycoming was integrated into a generic gas turbine modelling program called Turbotrans. Both engine performance predictions and the variation of output power with free turbine speed showed good correlation with manufacturer's data. The ability to simulate engine wear and damage via degraded component efficiencies was demonstrated but not validated. Keywords: Australia; Gas turbine engines. (kr).

A High Fidelity Real-Time Simulation of a Small Turboshaft Engine - National Aeronautics and Space Administration (NASA) 2018-07-17

A high-fidelity component-type model and real-time digital simulation of the General Electric T700-GE-700 turboshaft engine were developed for use with current generation real-time blade-element rotor helicopter simulations. A control system model based on the specification fuel control system used in the UH-60A Black Hawk helicopter is also presented. The modeling assumptions and real-time digital implementation methods particular to the simulation of small turboshaft engines are described. The validity of the simulation is demonstrated by comparison with analysis-oriented simulations developed by the manufacturer, available test data, and flight-test time histories. Ballin, Mark G. Ames Research Center DIGITAL SIMULATION; FLIGHT SIMULATION; HELICOPTERS; REAL TIME OPERATION; TURBINE ENGINES; TURBOSHAFTS; CONTROL SYSTEMS DESIGN; MODELS; ROTOR BLADES...

Continental Turboshaft Engine T65-T-1 (model TS325-1). - 196?

Model TS 120 Turboshaft Engine Program - National Technical

Information Service 1970

Helicopters - David Baker 1987
Discusses helicopter designs, how helicopters fly, and their many military uses.
The History of North American Small Gas Turbine Aircraft Engines - Richard A. Leyes 1999
This landmark joint publication between the National Air and Space Museum and the American Institute of Aeronautics and Astronautics chronicles the evolution of the small gas turbine engine through its comprehensive study of a major aerospace industry. Drawing on in-depth interviews with pioneers, current project engineers, and company managers, engineering papers published by the manufacturers, and the tremendous document and artifact collections at the National Air and Space Museum, the book captures and memorializes small engine development from its earliest stage. Leyes and Fleming leap back nearly 50 years for a first look at small gas turbine engine development and the seven major corporations that dared to produce, market, and distribute the products that contributed to major improvements and uses of a wide spectrum of aircraft. In non-technical language, the book illustrates the broad-reaching influence of small turbinesfrom commercial and executive aircraft to helicopters and missiles deployed in recent military engagements. Detailed corporate histories and photographs paint a clear historical picture of turbine development up to the present. See for yourself why The History of North American Small Gas Turbine Aircraft Engines is the most definitive reference book in its field. The publication of The History of North American Small Gas Turbine Aircraft Engines represents an important milestone for the National Air and Space Museum (NASM) and the American Institute of Aeronautics and Astronautics (AIAA). For the first time, there is an authoritative study of small gas turbine engines, arguably one of the most significant spheres of aeronautical technology in the second half o
Reverse-Flow Turboshaft Engine Study - K. M. Johansen 1970
The report presents the results of a program conducted to investigate the characteristics of a three-spool turboshaft engine having an unconventional turbine arrangement. In this engine, called a three-spool reverse-flow turboshaft engine, the combusted air passes through the high pressure (HP) turbine, then the power turbine, and finally through the low-pressure (LP) turbine. The performance, weight, envelope, and transient characteristics of this engine were compared to those of a more conventional two-spool turboshaft engine of comparable life and component technology. In addition, the suitability of the three-spool reverse-flow turboshaft engine for recuperation was assessed. The results of the study indicated that the three-spool reverse-flow turboshaft engine provides better part-power specific fuel consumption (SFC) than the two-spool engine. However, te engine is sensitive to ambient temperature variations, necessitating flat-rating of the engine to minimize the hot-day power lapse; is somewhat heavier; has a slightly larger envelope (length and diameter) and higher power-output speed; and requires approximately 3 seconds longer to accelerate from flight idle to 95 percent MRP. The reverse-flow engine component arrangement appears to have its greatest potential in a recuperated configuration.
Infrared Suppressor Effect on T63 Turboshaft Engine Performance - 1978

Aviation Coding Manual - United States. National Transportation Safety Board 1995

Second Law Characterization of Turboshaft Engine Performance - Christopher Daniel Wilson 2002

Real-time Hybrid Computer Simulation of a Small Turboshaft Engine and Control System - Clint E. Hart 1984

Marine/industrial Turboshaft Engine-high Pressure Compressor and Turbine-engine Monitoring Systems - R. P. Wagenaar 1985

Continental Turboshaft Engine Model 217-8B-1 - 196?

Helicopters - Ian Graham 1989
An introduction to the characteristics and uses of different types of helicopters.
Turbofan, Turboprop, Turboshaft Engine Study Program : Final Report - Palfreeman, B. J. 1965
Air-breathing Engine Test Facilities Register - North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development 1981
In context with its Symposium on 'Turbine Engine Testing' it has been the aim of the Propulsion and Energetics Panel of AGARD to offer to the NATO community a survey on air-breathing engine test facilities which are presently available in NATO countries. It was concluded that the main interest is focussed on test facilities for research and development of aero-engines to be used as prime thrusters. Consequently production and post-overhaul acceptance test facilities are not to be found in this register, even though in some cases they have been used for special investigations. In this book the reader will find a fairly complete survey of organizations which operate altitude and sea level test facilities for turbo-jet (including turbo-fan), ram-jet, and turbo-shaft engines. Though the book cannot claim comprehensiveness its initial working title was kept but the word register should not be understood in its prime sense and official meaning. Summary information about the test capacity of organizations and more detailed data for a number of individual test cells are offered and may be used for quick comparison and survey or for a preliminary selection of test facilities which the reader may wish to use in his research and development programmes.
T800/CTS800 Turboshaft Engine - Light Helicopter Turbine Engine Company 1992

Principles of Helicopter Aerodynamics with CD Extra - Gordon J. Leishman 2006-04-24
Written by an internationally recognized teacher and researcher, this book provides a thorough, modern treatment of the aerodynamic principles of helicopters and other rotating-wing vertical lift aircraft such as tilt rotors and autogiros. The text begins with a unique technical history of helicopter flight, and then covers basic methods of rotor aerodynamic analysis, and related issues associated with the performance of the helicopter and its aerodynamic design. It goes on to cover more advanced topics in helicopter aerodynamics, including airfoil flows, unsteady aerodynamics, dynamic stall, and rotor wakes, and rotor-airframe aerodynamic interactions, with final chapters on autogiros and advanced methods of helicopter aerodynamic analysis. Extensively illustrated throughout, each chapter includes a set of homework problems. Advanced undergraduate and graduate students, practising engineers, and researchers will welcome this thoroughly revised and updated text on rotating-wing aerodynamics.
Dynamic Simulation of a Wave Rotor Topped Turboshaft Engine - R. B. Greendyke 1997