

Environment Control System In Aircraft White Paper

Aircraft emissions currently account for ~3.5% of all greenhouse gas emissions. The number of passenger miles has increased by 5% annually despite 9/11, two wars and gloomy economic conditions. Since aircraft have no viable alternative to the internal combustion engine, improvements in aircraft efficiency and alternative fuel development become essential. This book comprehensively covers the relevant issues in green aviation. Environmental impacts, technology advances, public policy and economics are intricately linked to the pace of development that will be realized in the coming decades. Experts from NASA, industry and academia review current technology development in green aviation that will carry the industry through 2025 and beyond. This includes increased efficiency through better propulsion systems, reduced drag airframes, advanced materials and operational changes. Clean combustion and emission control of noise, exhaust gases and particulates are also addressed through combustor design and the use of alternative fuels. Economic imperatives from aircraft lifetime and maintenance logistics dictate the drive for "drop-in" fuels, blending jet-grade and biofuel. New certification standards for alternative fuels are outlined. Life Cycle Assessments are used to evaluate worldwide biofuel approaches, highlighting that there is no single rational approach for sustainable buildup. In fact, unless local conditions are considered, the use of biofuels can create a net increase in environmental impact as a result of biofuel manufacturing processes. Governmental experts evaluate current and future regulations and their impact on green aviation. Sustainable approaches to biofuel development are discussed for locations around the globe, including the US, EU, Brazil, China and India.

Test Techniques for Flight Control Systems of Large Transport Aircraft offers theory and practice of flight control system tests. It is a systematic and practical guide, providing insights to engineers in flight control, particularly those working on system integration and test validation. Ten chapters cover an introduction to flight control system tests, equipment tests and validation, software tests and validation, flight control law and flying qualities evaluation, tests of flight control subsystems, integration and validation based on the iron bird, ground-based test, flight-tests, airworthiness tests and validation, and finally, the current status and prospects for flight control tests and evaluation. Presents flight control system integration tests and validation for large transport aircraft Includes the most advanced methods and technologies available Details the latest research and its applications Offers theoretical and practical guidance that engineers can use Considers the state-of-the-art and looks to the future of flight control system tests

Control of Heat Stress in High-performance Aircraft

Commercial Supersonic Transport Program. Phase Ii-c. Interim Aircraft Performance Assessment Report. Environmental Control System Performance Specification

Preliminary Design of a Prototype Flight Unit of a Heat-Actuated Environmental Control System for NAVY Aircraft

Aircraft 39 C, Hu

An Integrated Assessment of Environmental Control System Cost for Civil Aircraft

Test Techniques for Flight Control Systems of Large Transport Aircraft

The report presents the results of a program for the detailed analysis and preliminary design of a full-scale prototype flight unit of a heat-actuated environmental control system for the cabin air conditioning requirements of Navy high-performance aircraft, as typified by the Navy F-4 fighter aircraft. Also part of this program was the identification of system components requiring development for adaptation to the aircraft flight environment and initiation of development testing. Test results are presented. The control concept is basically a vapor-compression system utilizing two thermodynamic cycles and a no-moving-parts device which replaces the conventional compressor. For this airborne application, main engine compressor bleed air is used as the heat source, although other heat sources, such as fuel burning, are also suitable. (Author).

Contains papers presented at an October 1999 symposium held in New Orleans, Louisiana, on cabin air quality measurements, chemicals and toxicity, standards, modeling and control of cabin air quality, cabin air quality and emerging issues, and relationships between cabin environment factors and comfo

Acoustical Considerations for Aircraft Environmental Control System Design

The Feasibility of Providing Aircraft Protection by Introducing an Anesthetic Into the Environmental Control System

747 Environmental Control System

Evaluation of Potential Environmental Control Systems for a Mach 3 Type Commercial Aircraft

Environmental Control System for Stol CH750 Aircraft

Feasibility Study of a Heat-actuated Environmental Control System for the Navy F-4 Fighter Aircraft

Current industry trends demonstrate aircraft electrification will be part of future platforms in order to achieve higher levels of efficiency in various vehicle level sub-systems. However electrification requires a substantial change in aircraft design that is not suitable for re-winged or re-engined applications as some aircraft manufacturers are opting for today. Thermal limits arise as engine cores progressively get smaller and hotter to improve overall engine efficiency[8], while legacy systems still demand a substantial amount of pneumatic, hydraulic and electric power extraction. The environmental control system (ECS) provides pressurization, ventilation and air conditioning in commercial aircraft[7], making it the main heat sink for all aircraft loads with exception of the engine. To mitigate the architecture thermal limits in an efficient manner, the form in which the ECS interacts with the engine will have to be enhanced as to reduce the overall energy consumed and achieve an energy optimized solution. This study examines a tradeoff analysis of an electric ECS by use of a fully integrated Numerical Propulsion Simulation System (NPSS) model that is capable of studying the interaction between the ECS and the engine cycle deck. It was found that a peak solution lays in a hybrid ECS where it utilizes the correct balance between a traditional pneumatic and a fully electric system. This intermediate architecture offers a substantial improvement in aircraft fuel consumptions due to a reduced amount of waste heat and customer bleed in exchange for partial electrification of the air-conditions pack which is a viable option for re-winged applications. Integrated Modular Avionics (IMA) architecture host multiple federated avionics applications into a single platform and provides benefits in terms of Size, Weight and Power (SWaP), nonetheless brings a high level of complexity to aircraft control systems. The thesis presents Model-Based System Engineering a novel, structured development methodology to cope efficiently with increased complexity due to IMA. Using ARCADIA methodology and the open source Capella tool, the developed methodology is implemented for a complete design cycle: starting with capturing requirements from the aircraft level to streamlining the development, integration of avionics application in an ARINC 653 platform. The proposed methodology provides effective traceability and management of specification artifacts from aircraft to system to item-level adhering to SAE ARP4754A guideline. Further, the thesis presents the capability of the MBSE framework to effectively address a few technological variants through the proposed methodology. To illustrate the efficiency of the methodology and MBSE approach an Environmental Control System (ECS) case study is presented. The case study focuses on implementing ECS in an IMA architecture using MBSE framework and proposed methodology. However, the derived methodology is also applicable to other systems. Further, the case study also presents a demonstration of integrating Cabin Pressure Control Sub-system (CPCS) into a real-time IMA platform for validation of MBSE approach. In addition, the thesis provides important insights in challenges and advantages of the MBSE process in contrast to the traditional paper-based specification process.

F81 Project

F93 - Project Design Aircraft Environmental Control System Including Pressurisation and Icing Protection Systems

Thermal Optimization of the Environmental Control System on an Advanced Aircraft with an Emphasis on System Efficiency and Design Methodology

Air Quality and Comfort in Airliner Cabins

Physiological Requirements for Design of Environmental Control Systems

Model-Based System Engineering Methodology for Implementing Networked Aircraft Control System on Integrated Modular Avionics - Environmental Control System Case Study

This specification describes the environmental control system and establishes its requirements and testing objectives. The system shall comply with Federal Aviation Agency requirements and shall consist of the following major subsystems: Air Conditioning, Windshield Rain Removal, Anti-Icing and Antifogging, and Oxygen.

System performance requirements are design objectives to be applied to the prototype airplanes. Application of these requirements to production airplane design will be established after prototype flight testing.

This third edition of Aircraft Systems represents a timely update of the Aerospace Series' successful and widely acclaimed flagship title. Moir and Seabridge present an in-depth study of the general systems of an aircraft – electronics, hydraulics, pneumatics, emergency systems and flight control to name but a few - that transform an aircraft shell into a living, functioning and communicating flying machine. Advances in systems technology continue to alloy systems and avionics, with aircraft support and flight systems increasingly controlled and monitored by electronics; the authors handle the complexities of these overlaps and interactions in a straightforward and accessible manner that also enhances synergy with the book's two sister volumes, Civil Avionics Systems and Military Avionics Systems. Aircraft Systems, 3rd Edition is thoroughly revised and expanded from the last edition in 2001, reflecting the significant technological and procedural changes that have occurred in the interim – new aircraft types, increased electronic implementation, developing markets, increased environmental pressures and the emergence of UAVs. Every chapter is updated, and the latest technologies depicted. It offers an essential reference tool for aerospace industry researchers and practitioners such as aircraft designers, fuel specialists, engine specialists, and ground crew maintenance providers, as well as a textbook for senior undergraduate and postgraduate students in systems engineering, aerospace and engineering avionics.

Environmental Control System

Environmental Control System, AMP36

Aircraft Systems

A-82 - Project Design Aircraft Environmental Control Systems

Environmental Control System : AMP36

System Description, Test and Troubleshooting

The results of analytical study investigating the feasibility of a new and unique environmental control concept for the cabin air conditioning requirements of the Navy F-4 fighter aircraft are reported. The heat-actuated Conductron environmental control concept is basically a vapor compression system which utilizes two thermodynamic loops and a unique device which replaces the conventional compressor. It is shown that an environmental control system based on the Conductron concept can be adapted to the Navy F-4 fighter aircraft with the existing constraints on weight, size, and power. The Conductron system can provide both cooling and heating under all aircraft operating conditions, including ground-static. Significant reductions in the compressor bleed air requirements, as compared to the present Navy F-4 air-cycle air conditioning system, can be realized with the Conductron environmental control system. The Conductron ECS can be used for cabin and equipment environmental control of all high-performance and subsonic aircraft. The specific results of this study are applicable to the Navy F-4 fighter aircraft only.

Although poor air quality is probably not the hazard that is foremost in peoples' minds as they board planes, it has been a concern for years. Passengers have complained about dry eyes, sore throat, dizziness, headaches, and other symptoms. Flight attendants have repeatedly raised questions about the safety of the air that they breathe. The Airliner Cabin Environment and the Health of Passengers and Crew examines in detail the aircraft environmental control systems, the sources of chemical and biological contaminants in aircraft cabins, and the toxicity and health effects associated with these contaminants. The book provides some recommendations for potential approaches for improving cabin air quality and a surveillance and research program.

Exergy-based Analysis of Aircraft Environmental Control Systems and Its Integration Into Model-based Design

Modeling and Simulation of an Aircraft Environmental Control System

Aircraft 39 C

New Environmental Control System for the B-52 G/H Aircraft

Scalable Modelling of Aircraft Environmental Control Systems

Aircraft 39 C, Cz

The assistance of MRL was requested by RAAF in determining the origins of contamination of turboprop bleed air used for environmental control in several Hercules C-130 transportation aircraft. Air sampling in the interior of affected planes was performed in-flight and on the ground, together with laboratory sampling of vapour from all of the suspected contaminating fluids. Gas chromatographic (GC) and GC/mass spectrometric (MS) analysis of collected samples confirmed that aviation turbine fuel (avtur) leakage produces a continuous background of hydrocarbon vapour around 0.1 to 0.5 ppm in affected aircraft. Positive indications of turbine oil vapours were found in filter bags taken from the air-duct system of suspect aircraft. Some traces of organophosphorous compounds, particularly the tricresyl phosphate additive in the oil, were found in the air filter bags. However at present there is no evidence to support a hypothesis that neurotoxic bicyclopophosphorous compounds derived from the oil additive are present. It is strongly recommended that in addition to normal maintenance of turbine oil seals and fuel nozzles, the use of charcoal cloth filters in the air ducting system be investigated as a means of absorbing the noxious odours. Australia. (fr).

Each year Americans take more than 300 million plane trips staffed by a total of some 70,000 flight attendants. The health and safety of these individuals are the focus of this volume from the Committee on Airliner Cabin Air Quality. The book examines such topics as cabin air quality, the health effects of reduced pressure and cosmic radiation, emergency procedures, regulations established by U.S. and foreign agencies, records on airline maintenance and operation procedures, and medical statistics on air travel. Numerous recommendations are presented, including a ban on smoking on all domestic commercial flights to lessen discomfort to passengers and crew, to eliminate the possibility of fire caused by cigarettes, and to bring the cabin air quality into line with established standards for other closed environments.

Air Quality and Safety

The Airliner Cabin Environment and the Health of Passengers and Crew

Environmental Control System, Se : AMP36

DHC-5 Environmental Control System

Aircraft 39

De Havilland Dash 8 Environmental Control System

Fundamentals of Aircraft Environmental ControlThe Airliner Cabin Environment and the Health of Passengers and CrewNational Academies Press

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 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 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.

Hybrid Environmental Control System Integrated Modeling Trade Study Analysis for Commercial Aviation

The Airliner Cabin Environment

A-85 Project Design Aircraft Environmental Control and Ice Protection Systems

Aeronautical Technologies for the Twenty-First Century

E-92 Business Jet, Project Design Aircraft Environmental Control System Design for Maintainability and Reliability

Reduction of Environmental Impact Through Aircraft Technology and Alternative Fuels

The issue of aircraft air quality is attracting considerable attention of late, as access to public air travel has expanded exponentially. Aircrew and passengers are increasingly concerned about operating and service decisions that could affect their health, comfort, and safety. The editor of this volume invited a wide range of experts to provide an in-depth treatment of virtually all aspects of aircraft cabin air quality. The topics are covered at a level comprehensible to all who fly as well as being of sufficient depth to be informative to decision makers concerned with purchase, design, operation, and servicing of passenger aircraft. Topics are grouped under: Control of Aircraft Cabin Air Quality; Possible Effects of Low Humidity, Decreased Outside Air Flows; and Effects of Some Aircraft Malfunctions on Cabin Air Quality. The volume concludes with Air Quality Systems for Related Enclosed Spaces, in which chapters cover air quality in buildings, ships, submarines, and spacecraft, which provide novel approaches potentially applicable to aircraft.

Fundamentals of Aircraft Environmental Control

Project Aircraft, Environmental Control System

Green Aviation

F76 Design Project

Environmental Control Systems for Executive Jet Aircraft