

2nd International Symposium on Aircraft Airworthiness 2011

Procedia Engineering Volume 17

**Beijing, China
26-28 October 2011**

Editors:

**Shuguang Zhang
Yanlai Zhang**

**Shuiting Ding
Junmin Du**

**ISBN: 978-1-62748-566-1
ISSN: 1877-7058**

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2011) by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

Contents

Preface.....	1
Review on Flight Performance Certification Standard for Wet and Contaminated Runway J. Yu	7
Overview of Certification of Aeroplane Takeoff and Landing Performance on Contaminated Runways J. Xu	13
A Method to Calculate the Aircraft Ground Minimum Control Speed based on Mathematical Simulation C. Huang, L. Wang, Z. Jia	24
Speed Measurement for Friction Test Vehicle based on GPS/Hall Sensor Information Fusion B. Wang, M. Gao, J. Tian, L. Liu, L. Wang	39
From Autorotation to Safe Landing J. Quan	46
A Safety Approach to Predict Human Error in Critical Flight Tasks K. Shan, Y. Li, M. Xu	52
An Approach of AHP for Human Factors Analysis in the Aircraft Icing Accident L. Chen, S. Chang	63
Regulatory Requirements for Certification of Head-Up-Displays with an Emphasis on Human Factors X. Liu	70
Using NASA-TLX to Evaluate the Flight Deck Design in Design Phase of Aircraft Y. Zheng, T. Yin, D. Dong, S. Fu	77
Analysis of Assessment Method about the Flight Technical Error based on Johnson Curves B. Dong, X. Luo	84
Several Thoughts on Conduct of Critical Process Quality Surveillance J. Liu, L. Guan, X. Zhang	90
Flying Control and Safety on Plateau Airports Z. Zhang	97
Research on Assessment Indices of Safety and Comfort for Flight in Wind Fields G. Han, S. Zhang	104
An Overview of the Effect of GNSS Operation at High Elevation Airport G. Zhang	117
Research on Risk Evaluation Using RNP Technology for Operation into High Elevation Airports with Critical Terrain X. Luo, D. Chen	125
3D Engineering Model of Downburst Evolution in Thunderstorm C. Tang, G. Hong	141
Super-cooled Large Droplets Consideration in the Droplet Impingement Simulation for Aircraft Icing P. Ke, X. Wang	151
Simulation of Ice Accretion based on Roughness Distribution Y. Li, C. Wang, S. Chang, D. Chen	160
A Hazard Analysis based Approach to Improve the Landing Safety of a Blended-wing-body Remotely Piloted Vehicle Y. Lu, S. Zhang, X. Li	178

Flying Qualities Reduction of Fly-by-wire Commercial Aircraft with Reconfiguration Flight Control Laws K. Zhou, L. Wang, X. Tan	179
A Safety Strategy for High-speed UAV Landing Taxiing Control Y. Lu, S. Zhang, L. Gong	197
Safety and Airworthiness Design of Ultra-Light and Very Light Amphibious Aircrafts D. Wu, Z. Wu, L. Zhang, J. Hu.	212
A Novel Emergency Flight Path Planning Strategy for Civil Airplanes in Total Loss of Thrust P. Tang, S. Zhang, L. Jin, Z. Tao	226
Damage Tolerant Design and Nondestructive Inspection – Keys to Aircraft Airworthiness F. Grandt, Jr.	236
Study on Key Certification Issues of Composite Airframe Structures for Commercial Transport Airplane Z. Zhang, Y. Zhang, X. Ou.	247
Analysis of Airworthiness Requirements on Amdt.25–132 of Limit of Validity to Preclude Widespread Fatigue Damage J. Xie, Y. Lu, P. He.	258
Study on Airworthiness Requirements of Composite Aircraft Structure for Transport Category Aircraft in FAA J. Xie, Y. Lu	270
Principles for Determining Material Allowable and Design Allowable Values of Composite Aircraft Structures W. Liu.	279
Research Development of Crashworthiness Simulation Evaluation on Civil Aircraft Z. Feng, P. Hao, T. Zou	286
Fatigue-Creep Life Analysis for Powder Metallurgy Material with Inclusion N. Hou, K. Yang	292
AE Beamforming Method for Damage Inspection of Aircraft Structures T. He, Q. Pan, X. Liu, Y. Shan	297
Summary and Analysis of the Aging Aircrafts' Failure Y. Wang, H. Long.	303
Study of Maintenance Task Generation Concept Model to Virtual Maintenance F. Wang, Y. Sun, Q. Xu	310
The Changes in Structural and Flight Safety due to Flap Design of Blended-Wing-Body Civil Aircraft J. Wu, C. Cai, Y. Zhang	320
Simulation of Lightning Protection for Composite Civil Aircrafts T. Zou, J. Wang, K. Mao, Z. Feng	328
Discussion on Certification of Main Transmission No Oil Test D. Wang, S. Ma.	335
Ground Inspection in Type Inspection Report H. Li, L. Ding	339
Studies on New Air Purification and Air Quality Control System of Airliner Cabin T. Hu, M. Liu, L. Pang, J. Wang.	343
Airworthiness Certification of Light Ejection Escape Equipment B. Gu	354
Do Safety Cases have a Role in Aircraft Certification? L. Sun, W. Zhang, T. Kelly.	358
Airworthiness Management of Light Sport Aircraft (LSA) in the Situation of Opening Low-Altitude Airspace Y. Wang, M. Fan.	369
Research on Airworthiness Management System about Military Aircraft Development J. Guo, K. Bai, L. Jia.	375
Brief Introduction of China Airworthiness Directive J. Yu, L. Liu	382
Comparison on the Ways of Airworthiness Management of Civil Aircraft Design Organization K. Yang, C. Liu.	388

The Simultaneous Development of Airworthiness Academic Education and Vocational Training J. Du, T. He, S. Zhang.	396
A Comparison of SAE ARP 4754A and ARP 4754 X. Li, Y. Zhu, Y. Fan, D. Su.	400
Safety Analysis of Airborne Weather Radar based on Failure Mode, Effects and Criticality Analysis C. Ma, Z. Gao, L. Yang.	407
Study on Airworthiness Requirement for the Position Quality of ADS-B System F. Yan, Z. Ma.	415
An ATC Simulation Platform based Compass Satellite Navigation System Z. Geng, Y. Zhao, Z. Ye.	422
Selection of Wiring Environment and Failure Rate Comparison Analysis in Aircraft Wiring Risk Assessment N. Xiao, Z. Ma, Y. Tian.	428
Research on the Factors Contributing to the Aircraft Wiring Failures Z. Ma, P. Wang, N. Xiao.	433
Application of Expert Judgment Method in the Aircraft Wiring Risk Assessment P. Wang, Z. Ma, Y. Tian.	440
Research on Aircraft Cable Defects Locating Method based on Time–Frequency Domain Reflection X. Shi, L. Zhang, T. Jing, L. Wang.	446
Design of Aircraft Cable Fault Diagnose and Location System based on Aircraft Airworthiness Requirement T. Jing, S. Zhang, X. Shi, L. Wang.	455
Aircraft EWIS Electromagnetic Interference Wiring Research P. Zhang, C. Wang.	465
Effect of Environments on EWIS Failure Rate Estimate W. Wang, P. Wang.	473
Coverage Analysis of Airborne Software Testing based on DO-178B Standard Y. Lu, Y. Zhao, X. Hou, Y. Sun, Y. Bao.	480
Research on Software Testing Technique of Airborne Equipment based on Airworthiness T. Feng, Y. Zhao, X. Hou, Y. Sun, Y. Bao.	489
A Study on Compiler Selection in Safety-critical Redundant System based on Airworthiness Requirement W. Chang, X. Bao, T. Zhao.	497
Safety Requirements Analysis for Control Law Development of UAV Flight Control Systems L. Gong, S. Zhang.	505
Application Research of Markov in Flight Control System Safety Analysis J. Yang, J. Zhang.	515
Certification Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor Failure H. Zhang, X. Li.	521
Blade Containment Evaluation of Civil Aircraft Engines B. Yang, Y. Zhou.	529
Safety Analysis of Flow Parameters in a Rotor-Stator Cavity G. Zhang, S. Ding.	530
Study of Uncontained Turbine Engine Rotor Failure Airworthiness Compliance Verification Method F. Wang, Y. Sun, H. Zeng.	531
Airworthiness Consideration in Improvement of Air System of Jet Engine Design S. Hou.	542
Transient Analysis of Volume Packing Effects on Turbofan Engine C. Liu, T. Qiu, S. Ding.	549
Research on the Methods of Compliance and Verification Technology based on FAR 33.28 X. Liu.	559
FHA Method for VBV Position Control Function of FADEC System based on Aero-Engine Dynamic Model S. Ding, T. Qiu, X. Liu, S. Zhang.	567

Sensitivity Analysis for Safety Design Verification of General Aviation Reciprocating Aircraft Engine J. Cao, S. Ding	580
Study on Regulating Law of Two-stage Turbo Charger System of Piston Aircraft Engine X. Ding, B. Xu	581
Time-Triggered State-Machine Reliable Software Architecture for Micro Turbine Engine Control Q. Zhang, G. Xu, S. Ding	587
Airworthiness Management of CFM56 Products in FAA and EASA Y. Gao, Y. Zhou	588
Thrust Reverser Optimization for Safety with CFD R. Qian, Z. Zhu, Z. Duan	595
Icing Certification of Civil Aircraft Engines B. Yang, Y. Zhou	603
CFD Approach to the Research and Design of Low Emission Commercial Aircraft Engine Combustor M. Zhang, Z. Fu, J. Li, Y. Lin	616
Low Emission Commercial Aircraft Engine Combustor Development in China: From Airworthiness Requirements to Combustor Design R. Fan, M. Zhang	618
Airworthiness Certification of Civil Aviation Fuel in China Z. Yang, H. Liu, Z. Xia	627
Airworthiness Certification of Civil Aero-chemicals in China H. Peng, Z. Xia, Z. Su	633
Method of Aircraft Fuel Tank System Ignition Source Fail-Safe Feature Analysis Y. Zhang, Y. Sun, F. Wang, H. Zeng	638
Analysis of Adaptive Cycle Engine Noise for Civil Aviation B. Li, D. Zhu	645
Positioning Rub of the Aero-Engine based on Acoustic Emission and Mathematical Morphology in Noise Background C. Ma, Y. Ma, T. He, Z. Gu	654
UG-based Research and Development of 3D Pipe Layout System of the Aircraft Engine Y. Lv, G. Zhao	660