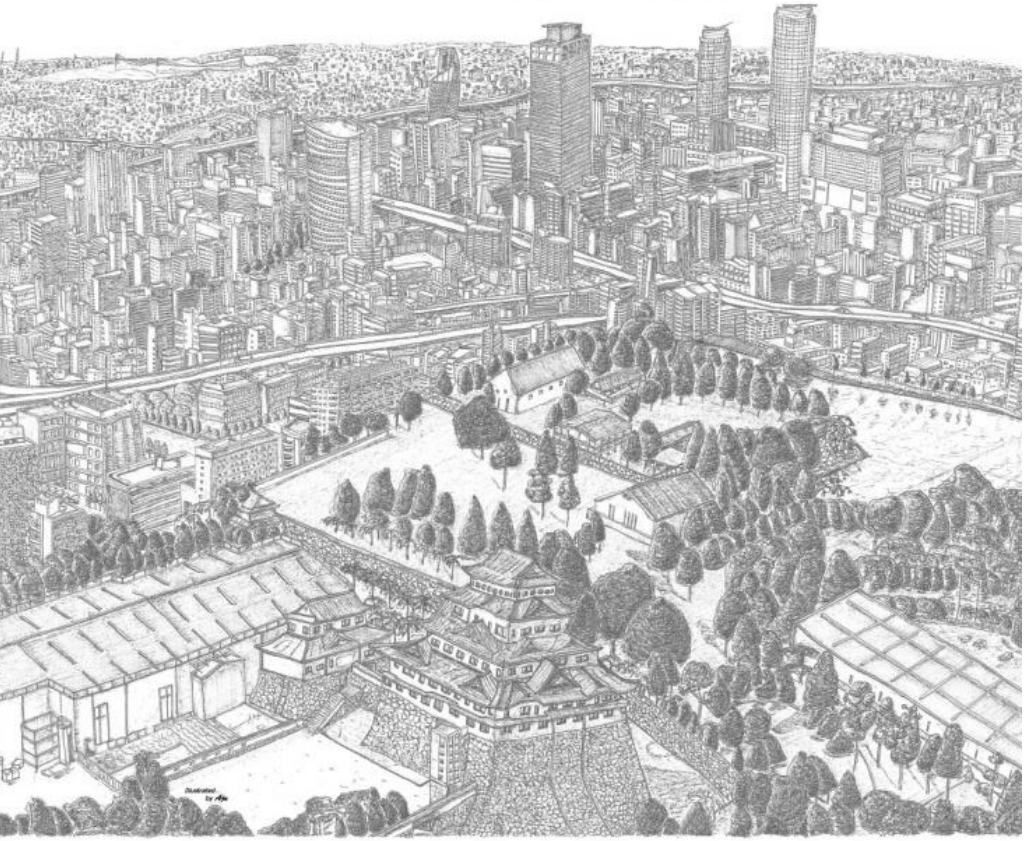
ICAF2017

International Committee on Aeronautical Fatigue and Structural Integrity



ICAF
International Committee on Aeronautical Fatigue and Structural Integrity

35th ICAF Conference

5-6 June, 2017

29th ICAF Symposium

7-9 June, 2017

Nagoya, Japan

35th CONFERENCE: JUNE 5 (Mon) - 6 (Tue)
29th SYMPOSIUM: JUNE 7 (Wed) - 9 (Fri)

Venue:	WINK AICHI
Technical Tour:	*MRJ* Assembly Line
Welcome Reception:	*Tokugawa* Museum
Chairperson:	N. Takeda (UTokyo)

ICAF2017
Nagoya, JAPAN

ICAF National Delegates

ICAF General Secretary

Prof. Anders Blom
Defense & Security, Systems and Technology
Swedish Defense Research Agency (FOI)
SE-164 90 Stockholm, Sweden

ICAF National Delegates

Phil Jackson
Airworthiness and Life Evaluation Group
Defense Science and Technology
506 Lorimer Street
Fishermans Bend VIC 3207, Australia

Dr. Min Liao
Group Leader-Structural Integrity
National Research Council Canada
1200 Montreal Rd, Ottawa, Ontario
Canada K1A 0R6

Prof. Degang Cui
Scientific Consultant
Chinese Aeronautical Establishment
No.2 Anwai Beiyuan Beijing 100012 P. R. China

Tomi Viitanen
Senior Scientist
VTT Technical Research Centre of Finland
Lifetime Management, Machine Health
P. O. Box 1000, FI-02044 VTT, Finland

Dr. Thierry Ansart
Head of Structures Division
DGA Techniques aéronautiques - BP 93123
31131 BALMA, France

Elke Hombergsmeier
Airbus Group Innovations
81663 Munich, Germany

Dr. Yuval Freed
Manager, Structural Analysis Department
Engineering & Development Group
Israel Aerospace Industries
Tel Aviv, Israel

Prof. Luigi Lazzeri
Universita di Pisa
Department of Civil and Industrial Engineering - Aerospace Division
Via G. Caruso, 8
56122 Pisa, Italy

Prof. Nobuo Takeda
The University of Tokyo, Vice President
Grad Sch Frontier Sciences, Dept Advanced Energy
5-1-5 Kashiwanoha, Kashiwa-shi, Chiba 277-8561, Japan

Dr. Antoni Niepokólczycki
Director, Materials and Structures Research Center (MSRC)
Institute of Aviation
Al. Krakowska 110/114
02-256 Warsaw, Poland

Hans Ansell
Saab Aeronautics
Saab AB
SE-581 88 Linköping, Sweden

Dr. Michel Guillaume
ZHAW Zurich University of Applied Sciences
Head of the Centre for Aviation
Technikumstrasse 9
8400 Winterthur, Switzerland

Marcel J. Bos
Netherlands Aerospace Centre (NLR)
P.O. Box 153
NL-8300 AD Emmeloord, The Netherlands

Dr. Steve Reed
Technical Fellow
Structural Integrity and Ageing Aircraft
Rm 102-E, Bldg 5 Platform Systems Division [dstl]
Porton Down Salisbury, Wilts, UK SP4 0JQ

Dr. Ravi Chona
USAF Senior Scientist - Structural Integrity
Air Force Research Laboratory
Aerospace Systems Directorate, AFRL/RQ
Wright-Patterson Air Force Base, OHIO 45433-7402
USA

ICAF2017
36th Conference
29th Symposium
Nagoya, JAPAN

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The ICAF017 Organizing Committee is grateful for the support of the following organaizationas:

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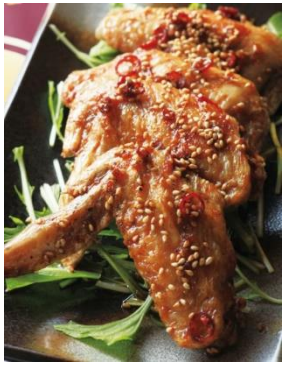
City of Nagoya



Wide-area Map

1 About 2 hours and 45 minutes by highway bus from JR Nagoya station

2 About 45 minutes by highway bus from JR Nagoya station

3 About 1 hour and 30 minutes from JR Nagoya station

©Ise Grand Shrine (JinguShicho)

4 About 4 hours and 30 minutes from JR Nagoya station

5 About 2 hours and 30 minutes from JR Nagoya station

6 About 1 hour and 30 minutes by JR from JR Nagoya station

7 About 1 hour and 30 minutes by JR and bus from JR Nagoya station

ICAF2017 Schedule
Conference

Sunday June 4

18:00-20:00	Registration

Monday June 5

Room A

8:00-17:00	Registration	
8:45	Welcome Address Nobuo Takeda — ICAF2017 Chairperson Teruo Kishi - President of ISMA (Innovative Structural Materials Association) Science Adviser to Foreign Minister of Japan Fumikazu Itoh - Director General, Aeronautical Technology Directorate, JAXA Yuichi Kitada - Vice President and Deputy General Manager, Engineering & Maintenance Division, Japan Airlines Co., Ltd.	*Chair: Nobuo Takeda*
9:15	Opening Address Anders Blom — General Secretary of ICAF	
9:30-10:10	National Review - USA Ravi Chona	
10:10-10:40	Coffee Break & Exhibition Visit	Sponsored by Shimadzu Corporation
		Chair: Marcel Bos
10:40-11:20	National Review - France Thierry Ansert	
11:20-11:50	National Review - Swizerland Michel Guillaume	
11:50-12:20	National Review - Sweden Hans Ansell	
12:20-13:20	Lunch Break & Exhibition Visit	
		Chair: Min Liao
13:20-13:55	National Review - China Degang Cui	
13:55-14:30	National Review - Brazil Carlos E. Chaves	
14:30-15:00	National Review - Finland Tomi Viitanen	
15:00-15:30	Coffee Break & Exhibition Visit	Sponsored by Shimadzu Corporation
		Chair: Elke Hombergsmeier
15:30-16:10	National Review - Australia Phil Jackson	
16:10-16:40	National Review - Italy Luigi Lazzeri	
16:40-17:15	National Review - Russia Boris Nesterenko	

A lunch box is served on the 6th floors during the lunch break.

Tuesday June 6

Room A

8:30-13:00	Registration	
		Chair: Hans Ansell
8:40-9:10	National Review - Japan Nobuo Takeda	
9:10-9:50	National Review - Germany Elke Hombergsmeier	
9:50-10:30	National Review - Canada Min Liao	
10:30-11:00	Coffee Break & Exhibition Visit	Sponsored by Shimadzu Corporation
		Chair: Tomi Viitanen
11:00-11:40	National Review - UK Stephen Reed	
11:40-12:10	National Review - The Netherlands Marcel Bos	
12:10-12:40	National Review - Israel Yuval Freed	
12:40-13:10	National Review - Poland Antoni Niepokólczycki	
13:10-14:00	Lunch Break & Exhibition Visit	
14:00-18:00	**Technical Tour**	

Technical visit to Mitsubishi Aircraft Corporation for MRJ assembly is arranged on Tuesday, June 6. Buses leave the venue at 14:00 group by group in 5 buses. Please be the lunch room on the 6th floors of WINC Aichi Conference Hall at 13:45.

The 2-minutes' short presentation files (limited to 2 pages) for all poster sessions are to be uploaded at the technical desk near the Registration between **10:30 and 13:00 on Tuesday June 6**.

ICAF Business Meeting on 6th Floor at 17:30

ICAF2017 Schedule
Symposium

Wednesday June 7

8:00-17:00 Registration

Room A

8:15-9:30 Session 1 - Plantema Lecture

8:15 Welcome Address
Mitsuo Kawakami - Director, Airworthiness Division, Aviation Safety and Security Department, Civil Aviation Beareau, Ministry of Land, Infrastructure, Transport and Tourism
TBD

8:25 Introduction
Anders Blom *General Secretary of ICAF*

8:35 Plantema Memorial Lecture *Chair: Anders Blom*
Three Faces of Aeronautical Fatigue
Abraham Brot *Former Israel National Delegate of ICAF*

9:35 Presentation of the Plantema Medal

9:40-10:20 Session 2 - Full Scale Testing *Chair: Ravi Chona*

9:40 **The Challenges in Airbus to Replace Full Scale Aircraft Fatigue Testing by Predictive Virtual Testing**
Linden Harris
Airbus SAS, France

10:00 **Full-Scale Fatigue Testing at Boeing Commercial Airplanes: From the 707 to the 787**
Steven Chisholm, Brandon Chapman, Shane Shaffner, Julie Smart, Timothy B. Adams, Kevin R.Davis
The Boeing Company, USA

10:20-10:50 Coffee Break, Poster & Exhibition Visit Sponsored by JAL (Japan Airlines)

10:50-12:10 Session 3 - Poster

10:40 Short Presentation of Poster Papers
2 min each 31 papers W1-W31 0.5 min interval

12:10-13:10 Lunch Break, Poster & Exhibition Visit

13:10-15:10 Session 4 - Advanced Analytical, Numerical and Experimental Methods *Chair: Thierry Ansert*

13:10 **Aircraft Fatigue Analysis in the Digital Age**
Kyle Graham, M. Artim and D. Daverschot
Airbus, United Kingdom

13:30 **Structural Damage and Repair Assessment for MRJ Aircraft**
Koji Setta[1], Toshiyasu Fukuoka[1], Keisuke Kumagai[1], Toshio Nakamura[2], Shunsuke Taba[2]
[1] Mitsubishi Aircraft Corporation, Japan, [2] Mitsubishi Heavy Industries, Japan

13:50 **State of the Art Curved Fuselage Panel Testing**
Mirko Sachse[1], Silvio Nebel[1], Sven Werner[2], Martin Semsch[1]
[1] IMA Materialforschung und Anwendungstechnik GmbH, Germany, [2] Airbus Operations GmbH, Germany

14:10 **Innovative Repair of Classic Hornet Centreline Pylons Based on Optimal Shape Reworking**
Xiaobo Yu[1], Jaime Calero[1], Simon Barter[1], Matt Gordon[2], Michael Opie[1]
[1] Defence Science and Technology Group, Australia, [2] Directorate General Technical Airworthiness, Australian Defence Force, Australia

14:30 **Application of Experimental Mechanics Techniques for Multiaxial Fatigue Testing**
David Backman[1], Hiroshi Nakamura[2], Min Liao[1], Tyler Musclow[1], Richard Desnoyers[1]
[1] National Research Council Canada, Canada [2] IHI Corporation, Japan

14:50 **Crack Location Effects on Fatigue Crack Growth Behaviour in Friction Stir Welded 2024-T3 Aluminium**
Kan Zhang, Weifeng Zang, An Chen, Dengke Dong
AVIC Aircraft Strength Research Institute, China

15:10-15:40 Coffee Break, Poster & Exhibition Visit Sponsored by ANA (All Nippon Airways)

15:40-17:20 Session 5 - Residual Stress Engineering *Chair: Stephen Reed*

15:40 **The Hybridized Application of Crenellation and Laser Heating Techniques in Improving the Fatigue Performance of Airframe Structures**
Jin Lu, Norbert Huber, Nikolai Kashaev
Helmholtz-Zentrum Geesthacht, Germany

16:00 **Study of Mechanical Properties in Composites with Neutron Time-of-Flight Diffraction Method**
Elżbieta Gadalińska[1], Andrzej Baczmański[2], Mirosław Wróbel[2], Sebastian Wroński[2], Christian Scheffzük[3,4], M. Malicki[1]
[1] Institute of Aviation, Poland, [2] AGH-University of Science and Technology, Poland, [3] Karlsruhe Institute of Technology, Germany, [4] Frank Laboratory of Neutron Physics, Russia

16:20 **Fatigue Crack Growth Behavior in Residual Stress Field Formed by Friction Stir Welding**
Takao Okada[1], Shigeru Machida[1], Toshiya Nakamura[1], Takuya Noguchi[2], Hirokazu Tanaka[2], Motoo Asakawa[2]
[1] Japan Aerospace Exploration Agency, Japan, [2] Waseda University, Japan

16:40 **Coldworking Holes with Shape Memory Alloy Sleeves**
Albert S. Kuo
A.S.K. INTERNATIONAL, Inc., USA

17:00 **Laser Shock Peening as Surface Technology to Extend Fatigue Life in Metallic Airframe Structures**
Domenico Furfari[1], Nikolaus Ohrloff[1],Elke Hombergsmeier[2], Ulrike Heckenberger[2], Vitus Holzinger[2]
[1] Airbus Operations GmbH, Germany, [2] Airbus Group Innovations, Germany

(17:30 Transportation to Tokugawa Art Museum/Tokugawaen)

18:15-20:00 Symposium Reception at Tokugawa Art Museum/Tokugawaen

(20:00 Transportation to Venue)

Poster Sessions

Hung to the poster stand at 8:00-9:00 am and remove it after the session before 17:20. Stay at their poster during 2 coffee breaks and lunch break.

Uploading Presentation Files

- At technical desk near the Registration
- Only during the breaks
- For morning sessions, upload on the day before

Symposium Reception (Tokugawaen) at 18:15

Buses leave the venue at 17:40. Be at Room B at 17:30.

Thursday June 8

8:00-17:00 Registration

Room A

8:15-8:55 Session 6 - ICAF2017 Special Lecture *Chair: Luigi Lazzeri*

8:15 **Some Experiences from 31 years of ICAF Attendance and Some Thoughts for the Future**
Anders Blom *General Secretary of ICAF, Swedish Defence Research Agency (FOI)*

9:00-10:20 Session 7 - Full Scale Fatigue Tests and Management of Aging Fleets *Chair: Phil Jackson*

9:00 **Long Term Viper—Flying the F-16 to 8000 Hours and Beyond!**
Kimberli Jones[1], Bryce Harris[1], Matthew Regan[1], Scott V. May[2], Austin Rickards[1], Kevin Welch[2]
[1] United States Air Force, USA, [2] Lockheed Martin Aeronautics, USA

9:20 **Fatigue Testing of New Generation Wide Body Aircraft at Benchmark Level**
Fin Schorr, Olaf Tusch, Don Wu, Andreas Mösenbacher, Marcus Reimann, Armin Urban, Michael Stodt
IAB GmbH, Germany

9:40 **An Overview of Standardized Capability for US Air Force Inspections**
Eric Lindgren, John Brausch
Air Force Research Laboratory, USA

10:00 **Airbus Wing Integration Centre. Filton, Britol, UK**
Steve Raynes
Airbus Operations Ltd, Filton, United Kingdom

10:20 **F-18 Flight Control Surface Life Extension Testing - CF-18 Horizontal Stabilator**
C. Andre Beltempo[1], Robert Rutledge[1], Marko Yanishevsky[1], David Backman[1], Marc Genest[1], Alexis Roussel[2]. Jonathan Juurlink[3]
[1] National Research Council Canada, [2] L3 MAS, [3] Royal Canadian Air Force

10:40-11:00 Coffee Break, Poster & Exhibition Visit Sponsored by ShinMaywa Ltd

11:10-12:25 Session 8 - Poster

11:10 Short Presentation of Poster Papers
2 min each 30 papers T1-T30 0.5 min interval

12:25-13:25 Lunch Break, Poster & Exhibition Visit

13:25-15:45 Session 9 - Full Scale Fatigue Tests and Management of Aging Fleets *Chair: Yuval Freed*

13:25 **Full-Scale Fatigue Testing of Two T-38 Wings Part II**
Marcus Stanfield[1], David Wieland[1], Jon Cutshall[1], Michael Blinn[2]
[1] Southwest Research Institute, USA, [2] United States Air Force, USA

13:45 **A New Experience of Fatigue Testing with the A350 XWB**
Peter Bösch[1], David Eyre-Jackson[2]
[1] Airbus Operation SAS, France, [2] Airbus Operations GmbH, Germany

14:05 **Blueprint TITANS: A Roadmap towards the Virtual Fatigue Test through a Collaborative International Effort**
Albert Wong
Defence Science & Technology Group, Australia

14:25 **A Review of Fatigue Test of Full Scale Aeronautical Structures in TsAGI during the Period from 2015 to 2017**
M.C. Zichenkov[1], V.V. Konovalov[1], K.S. Scherban[1], V.H. Sahin[2], A.G. Kalish[3], A.B. Zholobov[4], V.D. Chuban[5], S.I. Tsurkov[6], S.V. Kulikov[7]
[1] Central Aerohydrodynamic Institute, [2] Sukhoyi Civil Aircraft Company, [3] Ilyushin Aviation Complex, [4] Concern "Sukhoi Attack Aircraft", [5] Yakovlev Company, [6] Irkut Corporation, [7] Aerocomposite Company, Russia

14:45 **Extending the German Air Force Tornado Fleet Operation - Concept of the Service Life Enhancement Project**
Daniel Raatz
Airbus Defence and Space GmbH, Germany

15:05 **Fleet Management Decision Making With Individual Aircraft Tracking Data**
Jeff Newcamp, Wim J.C. Verhagen, Richard Curran
Delft University of Technology, the Netherlands

15:25 **Use of Full Scale Fatigue Test Results to Produce Accurate Fatigue Life Predictions: Lessons Learned**
Shehzad Saleem Khan[1], Alessandro Migliaccio[1], Dort Daandels[2]
[1] Airbus Operations, United Kingdom, [2] Airbus Operations GmbH, Germany

15:45-16:15 Coffee Break, Poster & Exhibition Visit Sponsored by Fatigue Technology (FTI)

16:15-17:55 Session 10 - Composite Materials / Adhesively Bonded Joints *Chair: Degang Cui*

16:15 **A Damage Modeling Framework for Fatigue Damage Evolution in Composite Laminates**
David Mollenhauer[1], Mark Flores[1], Endel Iarve[2], Kevin Hoos[2], Michael Braginsky[3], Eric Zhou[3]
[1] Air Force Research Laboratory, USA, [2] University of Texas at Arlington Research Institute, USA, [3] University of Dayton Research Institute, USA

16:35 **Effect of Environment on the Mechanical and Fatigue Behavior of Adhesive Bonded Repairs**
John Bakuckas[1], Ryan Neel[2], Yongzhe Tian[3], Ian Won[1], Mark Freisthler[1], Kelly Greene[4], Carlyn Brewer[4], Jonathan Awerbuch[5], Tien Min Tan[5]
[1] Federal Aviation Administration, USA, [2] FAA-Drexel Fellow, USA, [3] Diakon Corp, USA, [4] Boeing Company, USA. [5] Drexel University

16:55 **Fatigue Behavior and Damage Tolerant Design of Bonded Joints for Aerospace Application on Fiber Metal Laminates and Composites**
Thomas Kruse[1], Thomas Körwien[2], Robert Hangx[1], Calvin Rans[1]
[1] Delft University of Technology, the Netherland, [2] Airbus Defence and Space, Germany

17:15 **A New Study on Scatter Factors in Fatigue Testing of Composite Materials**
Yuval Freed, Dvir Elmalich
Israel Aerospace Industries, Israel

17:35 **Effect of Taper Angles on Delamination Strength of Tapered Composite Laminates**
Yuichiro Aoki, Sunao Sugimoto, Yutaka Iwahori, Toshiya Nakamura
Japan Aerospace Exploration Agency, Japan

(Walk to Nagoya Marriott Associa Hotel)

18:30-21:00 Symposium Banquet at Nagoya Marriott Associa Hotel

***Symposium Banquet* at 18:30**
Venue: Towers Ballroom, 16th Floor
Nagoya Marriott Associa Hotel near Nagoya Station

We walk to the Banquet Venue. Please be at Room B at 18:00 if you walk with our staff.

Friday June 9

8:00-15:00 Registration

Room A

8:15-8:50 Session 11 - Schive Award & Lecture *Chair: Marcel Bos*

8:15 Announcement of the Winner

8:20 Jaap Schijve Award Lecture

8:50-9:50 Session 12 - Young Researchers' Session *Chair: Michel Guillaume*

8:50 **Effect of Surface Roughness on Fatigue Crack Initiation in Additive Manufactured Components with Integrated Capillary for SHM Application**
Michaël Hinderdael[1], Dieter De Baere[1], Marc Moonens[1], Reza Vafadari[2], Patrick Guillaume[1]
[1] Vrije Universiteit Brussel, Belgium, [2] Universiteit Gent, Belgium

9:10 **The Effect of Decoupling of Corrosion and Fatigue**
Dinaz Tamboli[1], Simon Barter[2], Rhys Jones[1]
[1] Monash University, Australia, [2] Defence Science and Technology Group, Australia

9:30 **High-Functioning Composite T-Joint Using Atypical Stacking Sequence and Deltoid Structure**
Shinsaku Hisada, Kazunori Takagaki, Shu Minakuchi, Nobuo Takeda
The University of Tokyo, Japan

9:50-10:10 Coffee Break

10:10-12:10 Session 13 - Advanced Analytical, Numerical and Experimental Methods *Chair: Boris Nesterenko*

10:10 **Nucleation of Fatigue Cracks from Oxide Scales on Machined Pockets in Aircraft Structure**
Kevin Gibbons, Sandeep R. Shah
Sabreliner Aviation LLC, USA

10:30 **Probabilistic Damage Tolerance for Aircraft Fleets Using the FAA-Sponsored SMART|DT**
Juan Ocampo[1], Harry Millwater[2], Nathan Crosby[2], Beth Gamble[3], Chris Hurst[3], Marv Nuss[4], Michael Reyer[5], Sohrob Mottaghi[5]
[1] St. Mary's University, USA, [2] University of Texas at San Antonio, USA, [3] TEXTRON Aviation, USA, [4] Nuss Sustainment Solutions, [5] Federal Aviation Administration, USA

10:50 **Multiaxial Fatigue Life Assessment Using Cruciform Specimen for Ti-6Al-4V**
Hiroshi Nakamura[1], David Backman[2], Min Liao[2], Takuya Yoden[1],Tomoyuki Tanaka[1]
[1] IHI Corporation, Japan, [2] National Research Council, Canada

11:10 **Stress Intensity Factor Solutions to Cracks Emanating from Multiple Collinear Holes**
Wu Xu[1], Xue-Ren Wu[2], Yin Yu[1],Xiao-Jing Zhang[1],Xiu-Hua Cheng[1]
[1] Shanghai Jiao Tong University, China, [2] Beijing Institute of Aeronautical Materials, China

11:30 **Effect of Chromate on Corrosion Fatigue in Service Relevant Concentrations**
Sarah Galyon Dorman, Saravanan Arunachalam, Scot Fawaz
SAFE Inc., USA

11:50 **Damage Tolerance Test of Curved Panel with Longitudinal Crack Subjected to Pressurized Load**
An Chen, Jianghai Liao, Kan Zhang, Dengke Dong
Aircraft Strength Research Institute of China, China

12:10-13:00 Lunch Break

Schive Award & Lecture
Young Researchers' Session

Parallel Sessions at Room A and B

9:50-10:10 Coffee Break

Room B

10:10-12:10 Session 14 - Structural Health Monitoring (SHM) and Their Implementation *Chair: Iddo Kressel*

10:10 **Evaluation of Accidental Impact Scenarios For Transport Category Aircraft Based on Extensive Field Survey From Commercial Operators**
Stanislav Dubinskiy[1], Yuri Feygenbaum[2], Sergei Gvozdev[1], Andrei Selik[1]
[1]Central Aerohydrodynamic Institute, Russia, [2]State Scientific Research Institute of Civil Aviation, Russia

10:30 **Operational Loads Monitoring Program on Water Bomber Canadair CL-415**
Antonie Bisson, Hubert Groizard, Joseph Despujols, Bastien Bayart, Chloé Kinzelin, Elise Lamic, Etienne Deshaies
DGA Aeronautical Systems, France

10:50 **Optical Fiber Sensor Based Aircraft Structural Health Monitoring System**
Akira Kuraishi[1], Yuji Ikeda[1], Hiroshi Mamizu[1], Yoichi Nakamura[1], Toshizo Wakayama[1], Nobuo Takeda[2], Shu Minakuchi[2], Kiyoshi Enomoto[3]
[1] Kawasaki Heavy Industries, Ltd., Japan, [2] The University of Tokyo, Japan, [3] R&D Institute of Metals and Composites for Future Industries Research Association, Japan

11:10 **Recent Developments in SHM for Aircraft Structures – an Australian Defence Perspective**
Steve Galea, Nik Rajic, Claire Davis, Scott Moss, Cedric Rosalie, Joel Smithard, Stephen van der Veldev, George Jung, Pat Norman
Defence Science and Technology Group, Australia

11:30 **Verification of the RAF C-130J SHM System through Operational Loads Measurement**
Stephen Dosman, Alejandro Navarrete
Marshall Aerospace and Defence Group, United Kingdom

11:50 **Development of Ultrasonic Wave Based Structural Health Monitoring System for Practical Use**
Hideki Soejima[1], Kohei Takahashi[1], Kensuke Yoshimura[1], Masakatsu Abe[1], Megumi Hiraki[1], Nobuo Takeda[2], Noriyuki Sawai[3]
[1] SUBARU Corporation, Japan, [2] The University of Tokyo, Japan, [3] RIMCOF, Japan

12:10-13:00 Lunch Break

Room A

13:00-15:00 Session 15 - Advanced Analytical, Numerical and Experimental Methods *Chair: Antoni Niepokólczycki*

13:00 **Incorporation of Multiple Crack Nucleation Mechanisms into Initial Flaw Size Distributions for Risk Analysis**
Laura Domyancic
Southwest Research Institute, USA

13:20 **Risk Assessment of Multiple Site Damage in Fuselage Lap Splices**
Keyi Mao, Zhenyu Feng, Jun Zou
Civil Aviation University of China, China

13:40 **Numerical Prediction of Fatigue Crack Propagation in Cold-Expanded Holes**
Luisa Boni[1], Daniele Fanteria[1], Luigi Lazzeri[1], Domenico Furfari[2]
[1] University of Pisa, Italy, [2] Airbus Operations GmbH, Germany

14:00 **Towards a Physics Based Fatigue Crack Growth Equation – the Sixties Revisited**
Emiel Amsterdam
Netherlands Aerospace Centre, the Netherlands

14:20 **A Comprehensive Framework for Probabilistic Damage Tolerant Design of Aerospace Components**
Craig McClung, Michael Enright, Jonathan Moody, Yi-Der Lee, James Sobotka, Vikram Bhamidipati, John McClure
Southwest Research Institute, USA

14:40 **Creation, Verification and Validation of World's Largest K_I-data Bases for Multiple Cracks at a Countersunk and Straight-Shank Hole in a Plate Subject to Tension, Bending and Pin-Loading**
Börje Andersson[1], Jim Greer[2]
[1] BARE Börje Andersson Research & Engineering AB, Sweden, [2] U.S. Air Force's Academy Centre for Aircraft Structural Life Extension, USA

15:00-15:20 Coffee Break

15:20-17:00 Session 17 - Materials Innovations for Aircraft *Chair: Carlos E. Chaves*

15:20 **Zoning Considerations for Additively Manufactured Parts of High Criticality**
Michael Gorelik
Federal Aviation Administration, USA

15:40 **Fatigue Crack Propagation Resistance Relevant to Microstructure in a Friction Stirred TI-6AL-4V Titanium Alloy Joint**
Masakazu Okazaki, M. Muzvidziwa[2], S. Hirano[3]
[1] Nagaoka University of Technology, Japan, [2] Hitachi Automotive Systems Co., Japan, [3] Hitachi Research Lab., Japan

16:00 **Fatigue Crack Growth in Additive Manufactured Titanium: Residual Stress Control and Life Evaluation Method Development**
Xiang Zhang[1], Filomeno Martina[2], Abdul Khadar Syed[1], Xiang Wang[1], Jiluo Ding[2], Stewart Williams[2]
[1] Coventry University, United Kingdom, [2] Cranfield University, United Kingdom

16:20 **On the Application of Metal Foils for Improving the Impact Damage Tolerance of Composite Materials**
Maria Pia Falaschetti[1], Calvin Rans[2], Enrico Troiani[1]
[1] University of Bologna, Italy, [2] Delft University of Technology, Italy

16:40 **Fatigue Substantiation Process for Ti-alloy Casting Fittings with Critical Structural Responsibility and Casting Factor = 1.0**
Ismael Rivero Arevalo, Maria del Mar Andres Sosa, Efrain Miron Rubio, Javier Gomez-Escalonilla Martin, Jose Ignacio Armijo Torres
Airbus Defence and Space, Spain

17:20-17:50 Syumposium Closure

Nobuo Takeda, Japan — Pre-Announcement of ICAF 2019
Anders Blom, General Secretary of ICAF — Marcel Bos, Next General Secretary of ICAF

Room B

13:20-15:20 Session 16 - Structural Health Monitoring (SHM)/Non-Destructive Inspection (NDI) *Chair: Steve Galea*

13:00 **Active Training Data Selection for Gaussian Processes Designed to Predict Loads on Aircraft Landing Gear from Other In-Flight Measurements**
Geoffrey R. Holmes[1], Andrew Thomas[2], Wayne Capener[2], Keith Worden[1], Elizabeth Cross[1]
[1] The University of Sheffield, United Kingdom, [2] Safran Landing Systems UK Ltd, United Kingdom

13:20 **Optical Fibers Based Cure Monitoring for Boeing 737 Fuselage Skin Composite Repair**
Iddo Kressel[1], Uri Ben-Simon[1], K. Rozowsky[1], H. Leibovich[1], Z. Tron[1], B. Bloch[2], S. Pascal[2] G. Ghilai[1], M. Tur[3]
Israel Aerospace Industries, Israel, [2] CAAI, Israel, [3] Tel-Aviv University

13:40 **Integrating Structural Health Monitoring into ASIP: Probability of Detection and Risk Considerations**
David Forsyth
TRI/Austin, USA

14:00 **US Air Force Perspective on Validated Nondestructive Evaluation – Past, Present, and Future**
Eric Lindgren
Air Force Research Laboratory, USA

14:20 **Stress Corrosion Crack Depth Estimation Based on Eddy Current Signal Strength**
Andreas Uebersax[1], Cyril Huber[2], Raphael Zehnder[1], Josef Lussi[1], Stefan Frei[1]
[1] RUAG Aviation, RUAG Schweiz AG, Switzerland, [2] Institute of Mechanical Systems, ZHAW, Switzerland

14:40 **Influence of the Superalloy Structure Orientation on Ultrasonic Wave Attenuation**
Jacek Nawrocki[1], Wojciech Manaj[2], Kamil Gancarczyk[1], Robert Albrecht[3] Rafal Cygan[4], Krzysztof Krupa[1]
[1] Rzeszow University of Technology, Poland, [2] Institute of Aviation, Poland, [3] University of Silesia, Poland, [4] Consolidated Precision Products Polska,Poland

15:00-15:20 Coffee Break

15:20-17:00 Session 18 - Fleet Monitoring/Structural Lo *Chair: Shigeru Machida*

15:20 **Helicopter Manoeuvre Recognition: a Data-Driven Approach Using Two Different Data Sources**
Catherine Cheung, Alejandro Lehman Rubio, Julio J. Valdes
National Research Council, Canada

15:40 **Research on an Optimal Multiple Linear Regression Model for Aircraft Structural Load Analysis**
Hongna Dui, Yongjun Wang, Jiang Dong, Xiaodong Liu
AVIC CADI, China

16:00 **Spectrum Truncation or Spectrum Compression? : When Time and Money Matters and Nothing Less Than a Fraction of the Original Spectrum is Acceptable**
Chris Wallbrink, Beau Krieg
Defence Science and Technology Group, Australia

16:20 **Aircraft Structural Load Identification Technology with High Accuracy in SPHM System**
Yongjun Wang, Jiang Dong, Hongna Dui, Xiaodong Liu
Chengdu Aircraft Design & Research Institute, China

16:40 **Comparison of Numerical and Experimental Results for the Door Surround Structure of a Pressurized Fuselage**
Sven Werner[1], Matthias Goetze[2], Mirko Sachse[2], Zoran Stankovic[3], and Lance Howes[3]
[1] Airbus Operations GmbH, Germany, [2] IMA Materialforschung und Anwendungstechnik GmbH, [3] ELAN-AUSY GmbH