

# **35th ICAF Conference and 29th ICAF Symposium (ICAF 2017)**

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5 - 9 June 2017

Volume 1 of 3

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# ICAF2017 Schedule Conference



## Sunday June 4

18:00-20:00 Registration

## Monday June 5

### Room A

8:00-17:00	Registration		<i>Chair: Nobuo Takeda</i>
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.		
9:15	Opening Address Anders Blom General Secretary of ICAF		
9:30-10:10	National Review - USA 896 Ravi Chona		
10:10-10:40	Coffee Break & Exhibition Visit		Sponsored by Shimadzu Corporation <i>Chair: Marcel Bos</i>
10:40-11:20	National Review - France 398 Thierry Ansert		
11:20-11:50	National Review - Swizerland 805 Michel Guillaume		
11:50-12:20	National Review - Sweden 754 Hans Ansell		
12:20-13:20	Lunch Break & Exhibition Visit		<i>Chair: Min Liao</i>
13:20-13:55	National Review - China 257 Degang Cui		
13:55-14:30	National Review - Brazil 85 Carlos E. Chaves		
14:30-15:00	National Review - Finland 337 Tomi Viitanen		
15:00-15:30	Coffee Break & Exhibition Visit		Sponsored by Shimadzu Corporation <i>Chair: Elke Hombergsmeier</i>
15:30-16:10	National Review - Australia 1 Phil Jackson		
16:10-16:40	National Review - Italy 559 Luigi Lazzeri		
16:40-17:15	National Review - Russia 2296 Boris Nesterenko		



## Tuesday June 6

### Room A

8:30-13:00	Registration		
			<i>Chair: Hans Ansell</i>
8:40-9:10	National Review - Japan	584	
	Nobuo Takeda		
9:10-9:50	National Review - Germany	431	
	Elke Hombergsmeier		
9:50-10:30	National Review - Canada	133	
	Min Liao		
10:30-11:00	Coffee Break & Exhibition Visit		<i>Sponsored by Shimadzu Corporation</i>
			<i>Chair: Tomi Viitanen</i>
11:00-11:40	National Review - UK	829	
	Stephen Reed		
11:40-12:10	National Review - The Netherlands	635	
	Marcel Bos		
12:10-12:40	National Review - Israel	483	
	Yuval Freed		
12:40-13:10	National Review - Poland	699	
	Antoni Niepokólczycki		
13:10-14:00	Lunch Break & Exhibition Visit		
14:00-18:00	Technical Tour		



# 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 Bureau, Ministry of Land, Infrastructure, Transport and Tourism		
	Yasuhiro Toi - Managing Director, Japan Aircraft Development Corporation		
8:25	Introduction		
	<u>Anders Blom</u> <i>General Secretary of ICAF</i>		
8:35	Plantema Memorial Lecture		<i>Chair: Anders Blom</i>
	<b>Three Faces of Aeronautical Fatigue</b> 1186		
	[S1-1] <u>Abraham Brot</u> <i>Former Israel National Delegate of ICAF</i>		
9:35	Presentation of the Plantema Medal		
9:40-10:20	Session 2 - Full Scale Testing		<i>Chair: Ravi Chona</i>
9:40	[S2-1] <b>The Challenges in Airbus to Replace Full Scale Aircraft Fatigue Testing by Predictive Virtual Testing</b> 1226		
	<u>Linden Harris</u> <i>Airbus SAS, France</i>		
10:00	[S2-2] <b>Full-Scale Fatigue Testing at Boeing Commercial Airplanes: From the 707 to the 787</b> 1232		
	<u>Steven Chisholm</u> , Brandon Chapman, Shane Shaffner, Julie Smart, Timothy B. Adams, Kevin R. Davis <i>The Boeing Company, USA</i>		
10:20-10:50	Coffee Break, Poster & Exhibition Visit		<i>Sponsored by JAL (Japan Airlines)</i>
10:50-12:10	Session 3 - Poster		
10:50	Short Presentation of Poster Papers		
	2 min each <b>31 papers W1-W31</b> 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		<i>Chair: Thierry Ansert</i>
13:10	[S4-1] <b>Aircraft Fatigue Analysis in the Digital Age</b> 1242		
	<u>Kyle Graham</u> , M. Artim and D.Daverschot <i>Airbus, United Kingdom</i>		
13:30	[S4-2] <b>Structural Damage and Repair Assessment for MRJ Aircraft</b> 1247		
	<u>Koji Setta</u> <sup>1</sup> , Toshiyasu Fukuoka <sup>1</sup> , Keisuke Kumagai <sup>1</sup> , Toshio Nakamura <sup>2</sup> , Shunsuke Taba <sup>2</sup> <sup>1</sup> Mitsubishi Aircraft Corporation, Japan, <sup>2</sup> Mitsubishi Heavy Industries, Japan		
13:50	[S4-3] <b>State of the Art Curved Fuselage Panel Testing</b> 1254		
	<u>Mirko Sachse</u> <sup>1</sup> , Silvio Nebel <sup>1</sup> , Sven Werner <sup>2</sup> , Martin Semsch <sup>1</sup> <sup>1</sup> IMA Materialforschung und Anwendungstechnik GmbH, Germany <sup>2</sup> Airbus Operations GmbH, Germany		



14:10	[S4-4]	<b>Innovative Repair of Classic Hornet Centreline Pylons Based on Optimal Shape Reworking</b> 1262 Xiaobo Yu <sup>1</sup> , Jaime Calero <sup>1</sup> , Simon Barter <sup>1</sup> , Matt Gordon <sup>2</sup> , Michael Opie <sup>1</sup> <sup>1</sup> Defence Science and Technology Group, Australia <sup>2</sup> Directorate General Technical Airworthiness, Australian Defence Force, Australia	
14:30	[S4-5]	<b>Application of Experimental Mechanics Techniques for Multiaxial Fatigue Testing</b> 1272 David Backman <sup>1</sup> , Hiroshi Nakamura <sup>2</sup> , Min Liao <sup>1</sup> , Tyler Musclow <sup>1</sup> , Richard Desnoyers <sup>1</sup> <sup>1</sup> National Research Council Canada, Canada, <sup>2</sup> IHI Corporation, Japan	1272
14:50	[S4-6]	<b>Crack Location Effects on Fatigue Crack Growth Behaviour in Friction Stir Welded 2024-T3 Aluminium</b> 1282 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	[S5-1]	<b>The Hybridized Application of Crenellation and Laser Heating Techniques in Improving the Fatigue Performance of Airframe Structures</b> 1291 Jin Lu, Norbert Huber, Nikolai Kashaev Helmholtz-Zentrum Geesthacht, Germany	
16:00	[S5-2]	<b>Study of Mechanical Properties in Composites with Neutron Time-of-Flight Diffraction Method</b> 1301 Elżbieta Gadalińska <sup>1</sup> , Andrzej Baczmański <sup>2</sup> , Mirosław Wróbel <sup>2</sup> , Sebastian Wroński <sup>2</sup> , Christian Scheffzük <sup>3,4</sup> , M. Malicki <sup>1</sup> <sup>1</sup> Institute of Aviation, Poland, <sup>2</sup> AGH-University of Science and Technology, Poland <sup>3</sup> Karlsruhe Institute of Technology, Germany, <sup>4</sup> Frank Laboratory of Neutron Physics, Russia	
16:20	[S5-3]	<b>Fatigue Crack Growth Behavior in Residual Stress Field Formed by Friction Stir Welding</b> 1310 Takao Okada <sup>1</sup> , Shigeru Machida <sup>1</sup> , Toshiya Nakamura <sup>1</sup> , Takuya Noguchi <sup>2</sup> , Hirokazu Tanaka <sup>2</sup> , Motoo Asakawa <sup>2</sup> <sup>1</sup> Japan Aerospace Exploration Agency, Japan, <sup>2</sup> Waseda University, Japan	
16:40	[S5-4]	<b>Coldworking Holes with Shape Memory Alloy Sleeves</b> 1317 Albert S. Kuo A.S.K. INTERNATIONAL, Inc., USA	
17:00	[S5-5]	<b>Laser Shock Peening as Surface Technology to Extend Fatigue Life in Metallic Airframe Structures</b> 1327 Domenico Furfari <sup>1</sup> , Nikolaus Ohrloff <sup>1</sup> , Elke Hombergsmeier <sup>2</sup> , Ulrike Heckenberger <sup>2</sup> , Vitus Holzinger <sup>2</sup> <sup>1</sup> Airbus Operations GmbH, Germany, <sup>2</sup> 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)



## Thursday June 8

8:00-17:00 Registration

### Room A

8:15-8:55	Session 6 - ICAF2017 Special Lecture	Chair: Luigi Lazzeri
8:15 [S6-1]	<b>Some Experiences from 31 years of ICAF Attendance and Some Thoughts for the Future</b> 1340	
	<u>Anders Blom</u> General Secretary of ICAF Swedish Defence Research Agency (FOI)	
9:00-10:40	Session 7 - Full Scale Fatigue Tests and Management of Aging Fleets	Chair: Phil Jackson
9:00 [S7-1]	<b>Long Term Viper—Flying the F-16 to 8000 Hours and Beyond!</b> 1342	
	<u>Kimberli Jones</u> <sup>1</sup> , Bryce Harris <sup>1</sup> , Matthew Regan <sup>1</sup> , Scott V. May <sup>2</sup> , Austin Rickards <sup>1</sup> Kevin Welch <sup>2</sup> <sup>1</sup> United States Air Force, USA, <sup>2</sup> Lockheed Martin Aeronautics, USA	
9:20 [S7-2]	<b>Fatigue Testing of New Generation Wide Body Aircraft at Benchmark Level</b> 1352	
	<u>Fin Schorr</u> , Olaf Tusch, Don Wu, Andreas Mösenbacher, Marcus Reimann, Armin Urban, Michael Stodt IAB GmbH, Germany	
9:40 [S7-3]	<b>An Overview of Standardized Capability for US Air Force Inspections</b> 1361	
	<u>Eric Lindgren</u> , John Brausch Air Force Research Laboratory, USA	
10:00 [S7-4]	<b>Airbus Wing Integration Centre. Filton, Britol, UK</b> 1369	
	<u>Steve Raynes</u> Airbus Operations Ltd, Filton, United Kingdom	
10:20 [S7-5]	<b>F-18 Flight Control Surface Life Extension Testing - CF-18 Horizontal Stabilator</b> 1379	
	<u>C. Andre Beltempo</u> <sup>1</sup> , Robert Rutledge <sup>1</sup> , Marko Yanishevsky <sup>1</sup> , David Backman <sup>1</sup> , Marc Genest <sup>1</sup> , Alexis Roussel <sup>2</sup> , Jonathan Juurlink <sup>3</sup> <sup>1</sup> National Research Council Canada, <sup>2</sup> L3 MAS, <sup>3</sup> Royal Canadian Air Force	
10:40-11:10	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 <b>34 papers T1-T34</b> 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 [S9-1]	<b>Full-Scale Fatigue Testing of Two T-38 Wings Part II</b> 1392	
	<u>Marcus Stanfield</u> <sup>1</sup> , David Wieland <sup>1</sup> , Jon Cutshall <sup>1</sup> , Michael Blinn <sup>2</sup> <sup>1</sup> Southwest Research Institute, USA, <sup>2</sup> United States Air Force, USA	
13:45 [S9-2]	<b>A New Experience of Fatigue Testing with the A350 XWB</b> 1399	
	<u>Peter Boesch</u> <sup>1</sup> , David Eyre-Jackson <sup>2</sup> <sup>1</sup> Airbus Operation SAS, France, <sup>2</sup> Airbus Operations GmbH, Germany	
14:05 [S9-3]	<b>Blueprint TITANS: A Roadmap towards the Virtual Fatigue Test through a Collaborative International Effort</b> 1408	
	<u>Albert Wong</u> Defence Science & Technology Group, Australia	





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14:25	[S9-4]	<b>A Review of Fatigue Test of Full Scale Aeronautical Structures in TsAGI during the Period from 2015 to 2017</b> 1417	
		M.C. Zichenkov <sup>1</sup> , V.V. Konovalov <sup>1</sup> , <u>K.S. Scherban</u> <sup>1</sup> , V.H. Sahin <sup>2</sup> , A.G. Kalish <sup>3</sup> , A.B. Zholobov <sup>4</sup> , V.D. Chuban <sup>5</sup> , S.I. Tsurkov <sup>6</sup> , S.V. Kulikov <sup>7</sup> <sup>1</sup> Central Aerohydrodynamic Institute, <sup>2</sup> Sukhoi Civil Aircraft Company <sup>3</sup> Ilyushin Aviation Complex, <sup>4</sup> Concern "Sukhoi Attack Aircraft" <sup>5</sup> Yakovlev Company, <sup>6</sup> Irkut Corporation, <sup>7</sup> Aerocomposite Company, Russia	
14:45	[S9-5]	<b>Extending the German Air Force Tornado Fleet Operation - Concept of the Service Life Enhancement Project</b> 1427	
		<u>Daniel Raatz</u> Airbus Defence and Space GmbH, Germany	
15:05	[S9-6]	<b>Fleet Management Decision Making With Individual Aircraft Tracking Data</b> 1437	
		<u>Jeff Newcamp</u> , Wim J.C. Verhagen, Richard Curran Delft University of Technology, the Netherlands	
15:25	[S9-7]	<b>Use of Full Scale Fatigue Test Results to Produce Accurate Fatigue Life Predictions: Lessons Learned</b> 1446	
		Shehzad Saleem Khan <sup>1</sup> , <u>Alessandro Migliaccio</u> <sup>1</sup> , Dort Daandels <sup>2</sup> <sup>1</sup> Airbus Operations, United Kingdom, <sup>2</sup> 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	[S10-1]	<b>A Damage Modeling Framework for Fatigue Damage Evolution in Composite Laminates</b> 1456	
		David Mollenhauer <sup>1</sup> , <u>Mark Flores</u> <sup>1</sup> , Endel Iarve <sup>2</sup> , Kevin Hoos <sup>2</sup> , Michael Braginsky <sup>3</sup> , Eric Zhou <sup>3</sup> <sup>1</sup> Air Force Research Laboratory, USA <sup>2</sup> University of Texas at Arlington Research Institute, USA <sup>3</sup> University of Dayton Research Institute, USA	
16:35	[S10-2]	<b>Effect of Environment on the Mechanical and Fatigue Behavior of Adhesive Bonded Repairs</b> 1463	
		<u>John Bakuckas</u> <sup>1</sup> , Ryan Neel <sup>2</sup> , Yongzhe Tian <sup>3</sup> , Ian Won <sup>1</sup> , Mark Freisthler <sup>1</sup> , Kelly Greene <sup>4</sup> , Carlyn Brewer <sup>4</sup> , Jonathan Awerbuch <sup>5</sup> , Tien Min Tan <sup>5</sup> <sup>1</sup> Federal Aviation Administration, USA, <sup>2</sup> FAA-Drexel Fellow, USA, <sup>3</sup> Diakon Corp, USA <sup>4</sup> Boeing Company, USA, <sup>5</sup> Drexel University	
16:55	[S10-3]	<b>Fatigue Behavior and Damage Tolerant Design of Bonded Joints for Aerospace Application on Fiber Metal Laminates and Composites</b> 1473	
		<u>Thomas Kruse</u> <sup>1</sup> , Thomas Körwien <sup>2</sup> , Robert Hangx <sup>1</sup> , Calvin Rans <sup>1</sup> <sup>1</sup> Delft University of Technology, the Netherland, <sup>2</sup> Airbus Defence and Space, Germany	
17:15	[S10-4]	<b>A New Study on Scatter Factors in Fatigue Testing of Composite Materials</b> 1483	
		<u>Yuval Freed</u> , Dvir Elmalich Israel Aerospace Industries, Israel	
17:35	[S10-5]	<b>Effect of Taper Angles on Delamination Strength of Tapered Composite Laminates</b> 1492	
		<u>Yuichiro Aoki</u> , Sunao Sugimoto, Yutaka Iwahori, Toshiya Nakamura Japan Aerospace Exploration Agency, Japan	
(Walk to Nagoya Marriott Associa Hotel)			
18:30-21:00		<b>Symposium Banquet at Nagoya Marriott Associa Hotel</b>	

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## 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 [S12-1] **Effect of Surface Roughness on Fatigue Crack Initiation in Additive Manufactured Components with Integrated Capillary for SHM Application** 1498

Michaël Hinderdael<sup>1</sup>, Dieter De Baere<sup>1</sup>, Marc Moonens<sup>1</sup>, Reza Vafadari<sup>2</sup>, Patrick Guillaume<sup>1</sup>,  
<sup>1</sup>Vrije Universiteit Brussel, Belgium, <sup>2</sup>Universiteit Gent, Belgium

9:10 [S12-2] **Decoupling of Fatigue and Corrosion** 1507

Dinaz Tamboli<sup>1</sup>, Simon Barter<sup>2</sup>, Rhys Jones<sup>1</sup>

<sup>1</sup>Monash University, Australia, <sup>2</sup>Defence Science and Technology Group, Australia

9:30 [S12-3] **High-Functioning Composite T-Joint Using Atypical Stacking Sequence and Deltoid Structure** 1519

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 [S13-1] **Nucleation of Fatigue Cracks from Oxide Scales on Machined Pockets in Aircraft Structure** 1529

Kevin Gibbons, Sandeep R. Shah

Sabreliner Aviation LLC, USA

10:30 [S13-2] **Probabilistic Damage Tolerance for Aircraft Fleets Using the FAA-Sponsored SMART|DT Software** 1540

Juan Ocampo<sup>1</sup>, Harry Millwater<sup>2</sup>, Nathan Crosby<sup>2</sup>, Beth Gamble<sup>3</sup>, Chris Hurst<sup>3</sup>,

Marv Nuss<sup>4</sup>, Michael Reyer<sup>5</sup>, Sohrob Mottaghi<sup>5</sup>

<sup>1</sup>St. Mary's University, USA, <sup>2</sup>University of Texas at San Antonio, USA

<sup>3</sup>TEXTRON Aviation, USA, <sup>4</sup>Nuss Sustainment Solutions

<sup>5</sup>Federal Aviation Administration, USA

10:50 [S13-3] **Multiaxial Fatigue Life Assessment Using Cruciform Specimen for Ti-6Al-4V** 1552

Hiroshi Nakamura<sup>1</sup>, David Backman<sup>2</sup>, Min Liao<sup>2</sup>, Takuya Yoden<sup>1</sup>, Tomoyuki Tanaka<sup>1</sup>

<sup>1</sup>IHI Corporation, Japan, <sup>2</sup>National Research Council, Canada

11:10 [S13-4] **Stress Intensity Factor Solutions to Cracks Emanating from Multiple Collinear Holes** 1559

Wu Xu<sup>1</sup>, Xue-Ren Wu<sup>2</sup>, Yin Yu<sup>1</sup>, Xiao-Jing Zhang<sup>1</sup>, Xiu-Hua Cheng<sup>1</sup>

<sup>1</sup>Shanghai Jiao Tong University, China, <sup>2</sup>Beijing Institute of Aeronautical Materials, China





## Room B

9:50-10:10	Coffee Break
10:10-12:10	Session 14 - Structural Health Monitoring (SHM) and Their Implementation <i>Chair: Iddo Kressel</i>
10:10 [S14-1]	<b>Evaluation of Accidental Impact Scenarios For Transport Category Aircraft Based on Extensive Field Survey From Commercial Operators</b> 1588 <u>Stanislav Dubinskiy</u> <sup>1</sup> , Yuri Feygenbaum <sup>2</sup> , Sergei Gvozdev <sup>1</sup> , Andrei Selik <sup>1</sup> <sup>1</sup> <i>Central Aerohydrodynamic Institute, Russia</i> <sup>2</sup> <i>State Scientific Research Institute of Civil Aviation, Russia</i>
10:30 [S14-2]	<b>Operational Loads Monitoring Program on Water Bomber Canadair CL-415</b> 1596 <u>Antonie Bisson</u> , Hubert Groizard, Joseph Despujols, Bastien Bayart, Chloé Kinzelin, Elise Lamic, Etienne Deshaies <i>DGA Aeronautical Systems, France</i>
10:50 [S14-3]	<b>Optical Fiber Sensor Based Aircraft Structural Health Monitoring System</b> 1606 Akira Kuraishi <sup>1</sup> , Yuji Ikeda <sup>1</sup> , <u>Hiroshi Mamizu</u> <sup>1</sup> , Yoichi Nakamura <sup>1</sup> , Toshizo Wakayama <sup>1</sup> , Nobuo Takeda <sup>2</sup> , Shu Minakuchi <sup>2</sup> , Kiyoshi Enomoto <sup>3</sup> <sup>1</sup> <i>Kawasaki Heavy Industries, Ltd., Japan</i> , <sup>2</sup> <i>The University of Tokyo, Japan</i> <sup>3</sup> <i>R&amp;D Institute of Metals and Composites for Future Industries Research Association, Japan</i>
11:10 [S14-4]	<b>Recent Developments in SHM for Aircraft Structures – an Australian Defence Perspective</b> 1616 <u>Steve Galea</u> , Nik Rajic, Claire Davis, Scott Moss, Cedric Rosalie, Joel Smithard, Stephen van der Veldev, George Jung, Pat Norman <i>Defence Science and Technology Group, Australia</i>



## Room A

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11:30	[S13-5]	<b>Effect of Chromate on Corrosion Fatigue in Service Relevant Concentrations</b> 1569
		Sarah Galyon Dorman, Saravanan Arunachalam, <u>Scot Fawaz</u> <i>SAFE Inc., USA</i>
11:50	[S13-6]	<b>Damage Tolerance Test of Curved Panel with Longitudinal Crack Subjected to Pressurized Load</b> 1579
		<u>An Chen</u> , Jianghai Liao, Kan Zhang, Dengke Dong <i>Aircraft Strength Research Institute of China, China</i>
<hr/>		
12:10-13:00		Lunch Break
<hr/>		
13:00-15:00		Session 15 - Advanced Analytical, Numerical and Experimental Methods <i>Chair: Antoni Niepokólczycki</i>
13:00	[S15-1]	<b>Incorporation of Multiple Crack Nucleation Mechanisms into Initial Flaw Size Distributions for Risk Analysis</b> 1644
		<u>Laura Domyancic</u> <i>Southwest Research Institute, USA</i>
<hr/>		
13:20	[S15-2]	<b>Risk Assessment of Multiple Site Damage Fuselage Lap Splices</b> 1654
		<u>Keyi Mao</u> , Zhenyu Feng, Jun Zou <i>Civil Aviation University of China, China</i>
<hr/>		
13:40	[S15-3]	<b>Numerical Prediction of Fatigue Crack Propagation in Cold-Expanded Holes</b> 1661
		<u>Luisa Boni</u> <sup>1</sup> , Daniele Fanteria <sup>1</sup> , Luigi Lazzeri <sup>1</sup> , Domenico Furfari <sup>2</sup> <sup>1</sup> University of Pisa, Italy, <sup>2</sup> Airbus Operations GmbH, Germany
<hr/>		
14:00	[S15-4]	<b>Towards a Physics Based Fatigue Crack Growth Equation – the Sixties Revisited</b> 1671
		<u>Emiel Amsterdam</u> <i>Netherlands Aerospace Centre, the Netherlands</i>
<hr/>		
14:20	[S15-5]	<b>A Comprehensive Framework for Probabilistic Damage Tolerant Design of Aerospace Components</b> 1672
		<u>Craig McClung</u> , Michael Enright, Jonathan Moody, Yi-Der Lee, James Sobotka, Vikram Bhamidipati, John McClure <i>Southwest Research Institute, USA</i>
<hr/>		
14:40	[S15-6]	<b>Creation, Verification and Validation of world's Largest <math>K_I</math>-data Bases for Multiple Cracks at a Countersunk or Straight-Shank Hole in a Plate subject to Tension, Bending and Pin-Loading</b> 1682
		<u>Börje Andersson</u> <sup>1</sup> , Jim Greer <sup>2</sup> <sup>1</sup> BARE Börje Andersson Research & Engineering AB, Sweden <sup>2</sup> U.S. Air Force's Academy Centre for Aircraft Structural Life Extension, USA
<hr/>		
15:00-15:20		Coffee Break

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## Room B

11:30	[S14-5]	<b>Verification of the RAF C-130J SHM System through Operational Loads Measurement</b> 1626 <u>Stephen Dosman</u> , Alejandro Navarrete <i>Marshall Aerospace and Defence Group, United Kingdom</i>
11:50	[S14-6]	<b>Development of Ultrasonic Wave Based Structural Health Monitoring System for Practical Use</b> 1636 <u>Hideki Soejima</u> <sup>1</sup> , Kohei Takahashi <sup>1</sup> , Kensuke Yoshimura <sup>1</sup> , Masakatsu Abe <sup>1</sup> , Megumi Hiraki <sup>1</sup> , Nobuo Takeda <sup>2</sup> , Noriyuki Sawai <sup>3</sup> <sup>1</sup> <i>SUBARU Corporation, Japan</i> , <sup>2</sup> <i>The University of Tokyo, Japan</i> , <sup>3</sup> <i>RIMCOF, Japan</i>
12:10-13:00		Lunch Break
13:20-15:20		Session 16 - Structural Health Monitoring (SHM)/Non-Destructive Inspection (NDI) <i>Chair: Steve Galea</i>
13:00	[S16-1]	<b>Active Training Data Selection for Gaussian Processes Designed to Predict Loads on Aircraft Landing Gear from Other In-Flight Measurements</b> 1692 <u>Geoffrey R. Holmes</u> <sup>1</sup> , Andrew Thomas <sup>2</sup> , Wayne Capener <sup>2</sup> , Keith Worden <sup>1</sup> , Elizabeth Cross <sup>1</sup> <sup>1</sup> <i>The University of Sheffield, United Kingdom</i> <sup>2</sup> <i>Safran Landing Systems UK Ltd, United Kingdom</i>
13:20	[S16-2]	<b>Optical Fibers Based Cure Monitoring for Boeing 737 Fuselage Skin Composite Repair</b> 1699 <u>Iddo Kressel</u> <sup>1</sup> , Uri Ben-Simon <sup>1</sup> , K. Rozowsky <sup>1</sup> , H. Leibovich <sup>1</sup> , Z. Tron <sup>1</sup> , B. Bloch <sup>2</sup> , S. Pascal <sup>2</sup> , G. Ghilai <sup>1</sup> , M. Tur <sup>3</sup> <i>Israel Aerospace Industries, Israel</i> , <sup>2</sup> <i>CAAI, Israel</i> , <sup>3</sup> <i>Tel-Aviv University</i>
13:40	[S16-3]	<b>Integrating Structural Health Monitoring into ASIP: Probability of Detection and Risk Considerations</b> 1703 <u>David Forsyth</u> <i>TRI/Austin, USA</i>
14:00	[S16-4]	<b>US Air Force Perspective on Validated Nondestructive Evaluation – Past, Present, and Future</b> 1710 <u>Eric Lindgren</u> <i>Air Force Research Laboratory, USA</i>
14:20	[S16-5]	<b>Stress Corrosion Crack Depth Estimation Based on Eddy Current Signal Strength</b> 1719 <u>Andreas Uebersax</u> <sup>1</sup> , Cyril Huber <sup>2</sup> , Raphael Zehnder <sup>1</sup> , Josef Lussi <sup>1</sup> , Stefan Frei <sup>1</sup> <sup>1</sup> <i>RUAG Aviation, RUAG Schweiz AG, Switzerland</i> <sup>2</sup> <i>Institute of Mechanical Systems, ZHAW, Switzerland</i>
14:40	[S16-6]	<b>Influence of the Superalloy Structure Orientation on Ultrasonic Wave Attenuation</b> 1728 <u>Jacek Nawrocki</u> <sup>1</sup> , Wojciech Manaj <sup>2</sup> , Kamil Gancarczyk <sup>1</sup> , Robert Albrecht <sup>3</sup> , Rafal Cygan <sup>4</sup> , Krzysztof Krupa <sup>1</sup> <sup>1</sup> <i>Rzeszow University of Technology, Poland</i> , <sup>2</sup> <i>Institute of Aviation, Poland</i> <sup>3</sup> <i>University of Silesia, Poland</i> , <sup>4</sup> <i>Consolidated Precision Products Polska, Poland</i>
15:00-15:20		Coffee Break



## Room A

15:20-17:00	Session 17 - Materials Innovations for Aircraft	Chair: Carlos E. Chaves
15:20 [S17-1]	<b>Zoning Considerations for Additively Manufactured Parts of High Criticality</b> 1732	
	Michael Gorelik Federal Aviation Administration, USA	
15:40 [S17-2]	<b>Fatigue Crack Propagation Resistance Relevant to Microstructure in a Friction Stirred TI-6AL- 4V Titanium Alloy Joint</b> 1742	
	Masakazu Okazaki, M. Muzvidziwa <sup>2</sup> , S. Hirano <sup>3</sup> <sup>1</sup> Nagaoka University of Technology, Japan, <sup>2</sup> Hitachi Automotive Systems Co., Japan, <sup>3</sup> Hitachi Research Lab., Japan	
16:00 [S17-3]	<b>Fatigue Crack Growth in Additive Manufactured Titanium: Residual Stress Control and Life Evaluation Method Development</b> 1751	
	Xiang Zhang <sup>1</sup> , Filomeno Martina <sup>2</sup> , Abdul Khadar Syed <sup>1</sup> , Xiang Wang <sup>1</sup> , Jiluo Ding <sup>2</sup> , Stewart Williams <sup>2</sup> <sup>1</sup> Coventry University, United Kingdom, <sup>2</sup> Cranfield University, United Kingdom	
16:20 [S17-4]	<b>On the Application of Metal Foils for Improving the Impact Damage Tolerance of Composite Materials</b> 1759	
	Maria Pia Falaschetti <sup>1</sup> , Calvin Rans <sup>2</sup> , Enrico Troiani <sup>1</sup> <sup>1</sup> University of Bologna, Italy, <sup>2</sup> Delft University of Technology, Italy	
16:40 [S17-5]	<b>Fatigue Substantiation Process for Ti-alloy Casting Fittings with Critical Structural Responsibility and Casting Factor = 1.0</b> 1768	
	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	Symposium Closure	
	Nobuo Takeda, Japan	Pre-Announcement of ICAF 2019
	Anders Blom, General Secretary of ICAF	Marcel Bos, Next General Secretary of ICAF





## Room B

15:20-17:00	Session 18 - Fleet Monitoring/Structural Load Analysis	Chair: Shigeru Machida
15:20 [S18-1]	<b>Helicopter Manoeuvre Recognition: a Data-Driven Approach Using Two Different Data Sources</b> 1777	
	Catherine Cheung, Alejandro Lehman Rubio, Julio J. Valdes National Research Council, Canada	
15:40 [S18-2]	<b>Research on an Optimal Multiple Linear Regression Model for Aircraft Structural Load Analysis</b> 1791	
	Hongna Dui, Yongjun Wang, Jiang Dong, Xiaodong Liu AVIC CADI, China	
16:00 [S18-3]	<b>Spectrum Truncation or Spectrum Compression? : When Time and Money Matters and Nothing Less Than a Fraction of the Original Spectrum is Acceptable</b> 1800	
	Chris Wallbrink, Beau Krieg Defence Science and Technology Group, Australia	
16:20 [S18-4]	<b>Aircraft Structural Load Identification Technology with High Accuracy in SPM System</b> 1811	
	Yongjun Wang, Jiang Dong, Hongna Dui, Xiaodong Liu Chengdu Aircraft Design & Research Institute, China	
16:40 [S18-5]	<b>Comparison of Numerical and Experimental Results for the Door Surround Structure of a Pressurized Fuselage</b> 1818	
	Sven Werner <sup>1</sup> , Matthias Goetze <sup>2</sup> , Mirko Sachse <sup>2</sup> , Zoran Stankovic <sup>3</sup> , and Lance Howes <sup>3</sup> <sup>1</sup> Airbus Operations GmbH, Germany <sup>2</sup> IMA Materialforschung und Anwendungstechnik GmbH, <sup>3</sup> ELAN-AUSY GmbH	



# ICAF2017

## Poster Session

Wednesday June 7

### Room B

W1	<b>A Macro-micro Coupled Fatigue Crack Initiation Life Predictive Method for Variable Amplitude Loadings</b> 1824 <u>Xiaoran Liu</u> <sup>1</sup> , Qin Sun <sup>1</sup> , Xianmin Chen <sup>1,2</sup> <sup>1</sup> Northwestern Polytechnical University, China <sup>2</sup> AVIC Aircraft Strength Research Institute, China
W2	<b>Experimental Measurement of Small Crack Stress Intensity Factors: Their Comparison to Analytical Solutions and Effects on Fatigue Crack Growth Rates</b> 1832 <u>Sandeep Shah</u> <sup>1</sup> , Jaspreet Singh <sup>2</sup> <sup>1</sup> Sabreliner Aviation LLC, USA, <sup>2</sup> United States Air Force Academy, USA
W3	<b>Impact Fatigue Life Prediction of Notched alloy-steel Specimen at High Strain Rates</b> 1833 <u>Qin Sun</u> , Xiaoran Liu, Ke Liang Northwestern Polytechnical University, China
W4	<b>Thermal Concentration Fluctuations in CFRP Structures Caused by Lightning Strike</b> 1842 <u>Yasunori Sato</u> , Hiroyuki Tsubata, Takayuki Nishi SUBARU Corporation, Japan
W5	<b>A Method of Fatigue Quality Determination for Splice Fastener Joints Under Multiaxial Fatigue Loading</b> 1846 <u>Xu Wang</u> , Wuxue Zhu Shanghai Aircraft Design & Research Institute, COMAC, China
W6	<b>Reliability Life Evaluation Method of Roller Wheel Based on Contact Stress</b> 1848 <u>Baocai Pang</u> , Jiangjing Xi, Dengke Dong AVIC Aircraft Strength Research Institute, China
W7	<b>Tokyo Metropolitan University - JAXA Collaborative Research on Composite Wing Structures</b> 1857 <u>Hikaru Hoshi</u> <sup>1</sup> , Naoyuki Watanabe <sup>2</sup> , Sunao Sugimoto <sup>1</sup> , Yutaka Iwahori <sup>1</sup> <sup>1</sup> Japan Aerospace Exploration Agency, Japan, <sup>2</sup> Tokyo Metropolitan University, Japan
W8	<b>Failure Analysis and Test of the Composite Elevator Trailing Edge Structure</b> 1865 <u>Xiuhua Chen</u> Shanghai Jiao Tong University, China
W9	<b>Fatigue Test Trial of CFRP Coupon Specimens</b> 1867 Hisaya Katoh <sup>1</sup> , Toshio Ogasawara <sup>2</sup> <sup>1</sup> Japan Aerospace Exploration Agency, Japan <sup>2</sup> Tokyo University of Agriculture and Technology, Japan
W10	<b>A Novel Composite-Metal Joint and Its Mechanical Performance and Fracture Behavior</b> 1873 <u>Longquan Liu</u> , Huaqing Tang, Han Feng Shanghai Jiao Tong University, China
W11	<b>Stress Analysis of Refill Friction Stir Spot Welding – An Analytical, Numerical and Experimental Investigation</b> 1878 <u>Robson Cristiano Brzostek</u> , Uceu Suhuddin Helmholtz-Zentrum Geesthacht GmbH, Germany



W12	<b>Damage Tolerance in CFRP Structures - Numerical and Experimental Analysis of Low Energy Near Edge Impacts</b> 1880 <i>Vjola Ristori<sup>1,2</sup>, Enrico Troiani<sup>1</sup>, Maria Pia Falaschetti<sup>1</sup>, Goran Ivetic<sup>3</sup></i> <i><sup>1</sup>University of Bologna, Italy, <sup>2</sup>Sii Deutschland, Germany</i> <i><sup>3</sup>Augsburg University of Applied Sciences, Germany</i>
W13	<b>Application of Bayesian Method to Determining a Simple Reliability Index on Composite Material Strength</b> 1888 <i>Seiichi Ito, Hisaya Katoh, Hikaru Hoshi</i> <i>Japan Aerospace Exploration Agency, Japan</i>
W14	<b>Fatigue Modeling for Intralaminar Damage Evolution in Composite Laminates Based on Damage State Variables</b> 1892 <i>Tomohiro Yokozeki, Ryoma Aoki</i> <i>The University of Tokyo, Japan</i>
W15	<b>3D Crack Propagation Testing and Modeling in Thick Aluminum 2024 T351</b> 1898 <i>Elise Lamic<sup>1</sup>, Frank Hofmann<sup>2</sup>, Pierre Madelpech<sup>1</sup></i> <i><sup>1</sup>DGA Aeronautical systems, France, <sup>2</sup>WIWeB, Germany</i>
W16	<b>Fatigue Crack Growth Behaviour in 2324-T39 Aluminium Alloy under Spectrum Loading: Experiments and Simulation</b> 1900 <i>Yamei Niu, Rui Bao, Binchao Liu, Ting Zhang, Songsong Lu, Kai Wang, Binjun Fei</i> <i>Beihang University, China</i>
W17	<b>Automation of Quantitative Fractography for Determination of Fatigue Crack Growth Rates with Marker Loads</b> 1910 <i>Weiping Hu<sup>1</sup>, Arnold Wiliem<sup>2</sup>, Brian Lovell<sup>2</sup>, Simon Barter<sup>1</sup>, Liangchen Liu<sup>2</sup></i> <i><sup>1</sup>Defence Science and Technology Group, Australia</i> <i><sup>2</sup>The Univeristy of Queensland, Australia,</i>
W18	<b>Visualization of Strain Distribution and Portent of Destruction in Structural Material through Mechanoluminescence</b> 1920 <i>Nao Terasaki, Yuki Fujio, Yoshitaro Sakata</i> <i>National Institute of Advanced Industrial Science and Technology, Japan</i>
W19	<b>Fatigue Life Prediction of CFRP Laminate of Transport Airplane Wing Upper Surface</b> 1927 <i>Vitaly Strizhius</i> <i>JSC AeroComposit, Russia</i>
W20	<b>Determination of Loads Acting on the Structure of an Aircraft Using Canonical Correlation Mapping of Flight Parameters</b> 1933 <i>Michal Dziendzikowski, Marcin Kurdelski, Wojciech Zielinski, Piotr Reymer, Michal Salacinski, Piotr Synaszko, Krzysztof Dragan</i> <i>Air Force Institute of Technology, Poland</i>
W21	<b>Fatigue Buckling and Post-Buckling Analysis of Stiffened Panel on Pure Shear</b> 1938 <i>Shaopu Su, Hulin Wang, Wenkui Chang, Dengke Dong</i> <i>AVIC, China</i>
W22	<b>Life Prediction by Simulation of Transverse Crack Initiation in CFRTP Laminates under Fatigue Loading</b> 1947 <i>Atsushi Hosoi<sup>1</sup>, Taichi Watanabe<sup>1</sup>, Akiya Ozeki<sup>1</sup>, Motoki Terauchi<sup>1</sup>, Akira Kobiki<sup>2</sup>, Hiroyuki Kawada<sup>1</sup></i> <i><sup>1</sup>Waseda University, Japan, <sup>2</sup>IHI Corporation, Japan</i>





W23	<b>A State-based Peridynamics Method for the Stability Analysis of Leading Edge of Aircraft Wing</b> 1955 Yin Yu <sup>1</sup> , Wu Xu <sup>1</sup> , Lu-yan Sun <sup>2</sup> , Xiuhua Chen <sup>1</sup> <sup>1</sup> Shanghai Jiao Tong University, China, <sup>2</sup> Commercial Aircraft Corporation of China, Ltd., China,	
W24	<b>Crack Prevention Design Research of Integral Stiffened Panel</b> 1963 Zhifang Liu, Xiuwen Sun, Shaobo Gong, Jinliang Wang, Wengang Hu, Hulin Wang, Kexiao Zhang, Tiejun Shen AVIC, Harbin Aircraft Industry Group Co.,LTD, China	
W25	<b>Research on Acoustic Fatigue Analysis Method for Typical Civil Aircraft Structure</b> 1973 Yu Wang, Zhendong Hu, Jiazhen Zhang Beijing Aeronautical Science and Technology Research Institute of COMAC, China	
W26	<b>Fatigue Life Assessment of Welded Joints under Step Loading Using Equivalent Crack Length Method</b> 1975 Takao Murakami, Yoichi Yamashita IHI Corporation, Japan	
W27	<b>Research on Fatigue Behavior and Fatigue Mechanisms of Martensite Stainless Steel</b> 1984 Junling Fan, Wendong Zhang, Xianmin Chen, Hong Chen Aircraft Strength Research Institute of China, China	
W28	<b>Experimental and Analytical Study of Structural Strength in Case of Wide Spread Fatigue Damages</b> 1989 Boris Nestrenko <sup>1</sup> , Grigory I. Nestrenko <sup>2</sup> <sup>1</sup> National Research Center "Zhukovsky Institute", Russia <sup>2</sup> Central Aerohydrodynamic Institute, Russia	
W29	<b>An Engineering Calculation Method of Probability Distribution of Crack Initiation Life for Widespread Fatigue Damage</b> 1999 Wei Xi, Jianjun Zhao Shanghai Aircraft Design and Research Institute, China	
W30	<b>Residual Strength Evaluation for Single and Mix Damage of Composite Laminates</b> 2000 Zejiang Li <sup>1</sup> , Qi Zhao <sup>1</sup> , Xitao Zheng <sup>2</sup> <sup>1</sup> Shanghai Aircraft Design and Research Institute, China <sup>2</sup> Northwest Polytechnical University, China	
W31	<b>Arresting Fatigue Crack in Composite Bonded Joint using Fiber-Reinforcement Design Feature</b> 2002 Shu Minakuchi, Nobuo Takeda The University of Tokyo, Japan	



## Thursday June 8

### Room B

T1	<b>Improving Fatigue Performance of AA 2024-T3 Clad Aeronautical Riveted Lap-Joints Using Laser-Peening</b> 2008 <u>David Osman Busse</u> <sup>1</sup> , P.E. Irving <sup>1</sup> , S. Ganguly <sup>1</sup> , Domenico Furfari <sup>2</sup> , Claudia Polese <sup>3</sup> <sup>1</sup> Cranfield University, United Kingdom, <sup>2</sup> Airbus Operations GmbH, Germany, <sup>3</sup> University of the Witwatersrand, South Africa	
T2	<b>Early Detection of Damage to the Nickel-Based Alloys using Nondestructive Methods</b> 2018 <u>Józef Krysztofik</u> <i>Institute of Aviation, Poland</i>	
T3	<b>Experiences on a Probability of Detection Project</b> 2034 <u>Jouni Pirtola</u> , Alekski Kunnari <i>Patria Aviation, Finland</i>	
T4	<b>Application of Interface Guided Waves for Structural Health Monitoring of Hybrid Bonded Joints</b> 2045 Mark Jahanbin <sup>1,2</sup> , S. Santhanam <sup>2</sup> , J.-B. Ihn <sup>1</sup> <sup>1</sup> The Boeing Company, USA, <sup>2</sup> Villanova University	
T5	<b>Non-linear Dynamic Analysis for the Lateral Vibration of Beams with Breathing Crack under Harmonic Excitation using Finite Element Method</b> 2053 <u>Berkay Ozkan</u> , E. Cigeroglu, G. Ozgen, F. Suat Kadioglu <i>Middle East Technical University, Turkey</i>	
T6	<b>C-135 Fuel Transfer Pipe Loads Monitoring, Tests and Simulations</b> 2062 <u>Bastien Bayart</u> , Joseph Despujols, Antoine Bisson <i>DGA Aeronautical Systems, France</i>	
T7	<b>Distributed Sensing Optical Fibres for Loads Monitoring during Full Scale Fatigue Testing</b> 2073 <u>Robert Rutledge</u> , D.S. Backman, A. Lehman Rubio <i>National Research Council, Canada</i>	
T8	<b>Understanding the Structural Usage of Rotary-wing Aircraft in the Military Environment</b> 2085 <u>Steve Reed</u> <i>Defence Science and Technology Laboratory, United Kingdom</i>	
T9	<b>Airworthiness Monitoring of the Wings of a UAV Fleet Using Fiber Optic Distributed Sensing</b> 2099 <u>I. Kressel</u> <sup>1</sup> , O. Shapira <sup>1</sup> , U. Ben-Simon <sup>1</sup> , A. Bergman <sup>2</sup> , S. Shoham <sup>1</sup> , B. Glam <sup>1</sup> , Moshe Tur <sup>2</sup> <sup>1</sup> Israel Aerospace Industries, Israel, <sup>2</sup> Tel-Aviv University, Israel	
T10	<b>A Research on the Vertical Tail Buffet Fatigue Load Sequence Generation Technology from the Advanced Aircraft Flight and Wind Tunnel Test Data</b> 2104 <u>Hu Huang</u> , Wei Jin, Yuan-Fang Chen, Huan-Bing Fu <i>Chengdu Aircraft Design &amp; Research Institute, AVIC, China</i>	
T11	<b>Full Scale Strength Tests of the XP-1 Aircraft</b> 2111 <u>Yasuhiro Kanno</u> , Toshimitsu Hayashi <i>Acquisition, Technology &amp; Logistics Agency(ATLA), Japan</i>	
T12	<b>Service Life Extension Program Based on Operational Load Monitoring System and Durability Test of the Ageing Fighter-Bomber Jet</b> 2112 <u>Marcin Kurdelski</u> , Piotr Reymer, Michał Stefaniuk, Artur Kurnytar <sup>1</sup> Air Force Institute of Technology, Poland	



T13	<b>Investigation of Fastener Hole Salvaging on the Fatigue Life of a Combat Aircraft Centre Fuselage</b> 2122 Geoff Swanton <sup>1</sup> , Richard Mazeika <sup>1</sup> , Zahi Hajjar <sup>2</sup> <sup>1</sup> Defence Science and Technology Group, Australia <sup>2</sup> FortburnPty Ltd, Australia, L-3 Military Aviation Services, Canada	
T14	<b>Bayesian Approach Based Probability Fatigue Life Prediction Method under Random Load Spectrum</b> 2132 Shaozhen Pan, Xiaodong Liu, Jiang Dong Chengdu Aircraft Design & Research Institute, AVIC, China	
T15	<b>Microstructural Analysis, Fracture Toughness and Fatigue Life of AA7050-T7451 and AA2050-T84 Alloys</b> 2140 Fernando Antônio Pascoal Junior <sup>1</sup> , <u>Giorgia Taiacol Aleixo</u> <sup>1</sup> , Carlos Eduardo Chaves <sup>1</sup> , Waldek Wladimir Bose Filho <sup>2</sup> <sup>1</sup> Embraer, Brazil, <sup>2</sup> EESC-USP, Brazil	
T16	<b>On the Control of Aircraft Structural Service Life</b> 2154 Yu-Ting He, Xu Du, Rong-Hong Cui, Teng Zhang, Sheng Zhang Air Force Engineering University, China	
T17	<b>Corrosion Fatigue Pit-to-Crack Test Methodology</b> 2164 Justin Rausch, Sarah Galyon Dorman, <u>Scot Fawaz</u> SAFE Inc., USA	
T18	<b>Experimental and Numerical Investigations of the Influence of Multiple Site Damage on the Fatigue Life of Corroded Aluminum Structures</b> 2174 Pascal Hamel, Elise Lamic DGA Aeronautical Systems, France	
T19	<b>Verification and Validation of Analytical Methods to Determine Life Improvement Factor Induced by Engineered Residual Stresses</b> 2183 Guillaume Renaud, Min Liao, Gang Li National Research Council, Canada	
T20	<b>Experimental and Numerical Study of NACA and Conventional Riveting Procedure</b> 2193 Wojciech Wronicz, Jerzy Kaniowski, Maciej Malicki, Pawel Kucio and Robert Klewicki Institute of Aviation, Poland	
T21	<b>Application of Deep Surface Rolling in Improving Fatigue Crack Growth Life of Aircraft Fuselage Structures</b> 2203 Liu Yao, P.E. Irving, Supriyo Ganguly Cranfield University, United Kingdom	
T22	<b>Effects of Surface Treatment on Residual Stress and Fatigue Life of Aerospace Alloys</b> 2212 Muhammad Kashif Khan <sup>1</sup> , Mike Fitzpatrick <sup>1</sup> , Young Shik Pyoun <sup>2</sup> <sup>1</sup> Coventry University, United Kingdom, <sup>2</sup> Sun-Moon University, Korea	
T23	<b>An Amphibian and the Concept of Its Derivative Model for Fire-fighting Application</b> 2222 Katsuo Tanaka, Atsuhiko Fujitani, Yushi Goda, <u>Masatoshi Tsujii</u> ShinMaywa Industries, Ltd., Japan	
T24	<b>The Influence of Laser Surface Treatment on the Fatigue Crack Growth of an Aluminium Alloy Sheet</b> 2226 Mauricio C. Cunha <sup>1,2</sup> , Carlos E. Chaves <sup>2</sup> and Milton S.F. Lima <sup>1,3</sup> <sup>1</sup> ITA, Brazil, <sup>2</sup> Embraer, Brazil, <sup>3</sup> IEAv, Brazil	
T25	<b>Mechanical Testing of Spherical Bearings with Focus on Wear and Coefficient of Friction Measurement</b> 2231 Jens Hornschuh, <u>Silvio Nebel</u> Institut für Materialforschung und Anwendungstechnik, Germany	



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T26	<b>Equivalent Conversion and Experimental Verification of Accelerated Corrosion of Dissimilar Metal Joints in Aircraft</b> 2238 <i>Yueliang Chen, Andong Wang, Guixue Bian, Yong Zhang</i> <i>Qingdao Branch, Naval Aeronautical Engineering Institute, Qingdao China</i>
T27	<b>Structural Restoration Viability Using Cold Spray Technology</b> 2248 <i>Saravanan Arunachalam, Scot Fawaz</i> <i>SAFE Inc., USA</i>
T28	<b>Influence of Thickness and Hole Diameter on Mutual Interaction of Two Opposing Cracks at a Hole</b> 2258 <i>Carmel Matias, Amran Yogeve</i> <i>Israel Aerospace Industries, Israel</i>
T29	<b>High Cycle Fatigue Behavior of Laser Beam Welded Ti-6Al-4V Butt Joints Subjected to Postweld Heat Treatment</b> 2278 <i>Fedor Fomin, Volker Ventzke, Nikolai Kashaev</i> <i>Helmholtz-Zentrum Geesthacht, Germany</i>
T30	<b>Nonlinear Deformation and Fracture of Laminated Composites</b> 2288 <i>Evgeny Lomakin<sup>1</sup>, Boris Fedulov<sup>2</sup>, Alexey Fedorenko<sup>2</sup></i> <i><sup>1</sup>Perm National Research Polytechnic University, Russia</i> <i><sup>2</sup>Skolkovo Institute of Science and Technology, Russia</i>

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