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## MINUTES OF PREVIOUS ICAF CONFERENCES

<b>Conf. No.</b>	<b>Held at</b>	<b>Date</b>	<b>Establishment, Editor</b>	<b>ICAF Doc. No.</b>
1	Amsterdam	1952	NLL, Plantema	14
2	Stockholm	1953	FAA, Noton	44
3	Cranfield	1955	RAE, Raithby	67
4	Zurich	1956	F+W, Keller	94
5	Brussels	1957	STAe(B), van Laer	115
6	Amsterdam	1959	NLL, Plantema and Schijve	126
7	Paris	1961	STAe(F), Barrois	220
8	Rome	1963	MDA, Villa	271
9	Munich	1965	LBF, Gassner	338
10	Melbourne	1967	ARL, Mann	412
11	Stockholm	1969	FFA, Wallgren	480
12	Miami	1971	NASA, Hardrath	561
13	London	1973	RAE, Pike	685
14	Lausanne	1975	F+W, Branger and Berger	800
15	Darmstadt	1977	LBF, Buxbaum and Franz	959
16	Brussels	1979	Admin. de l'Aeronautique, Maenhaut	1170
17	Noordwijkerhout	1981	NLR, de Jong and van der Linden	1215
18	Toulouse	1983	CEAT, Labourdette	1335
19	Pisa	1985	AIFE and U. of Pisa, Salvetti & Lazzeri	1489
20	Ottawa	1987	NAE, Simpson	1602
21	Jerusalem	1989	Technion, Berkovits	1681
22	Tokyo	1991	U. of Tokyo, Kobayashi	1816
23	Stockholm	1993	FFA, Blom	1950
24	Melbourne	1995	AMRL, Grandage and Jost	2054
25	Edinburgh	1997	DERA, Poole	2164
26	Seattle	1999	AFRL, Rudd	2265
27	Toulouse	2001	AAAF, Rouchon	2288
28	Lucerne	2003	RUAG Aerospace, Guillaume	2310

## **GENERAL SECRETARY'S REVIEW**

on the activities of the

## **INTERNATIONAL COMMITTEE ON AERONAUTICAL FATIGUE (ICAF)**

during the period June 2001 to May 2003

### **27<sup>TH</sup> ICAF MEETING IN TOULOUSE FRANCE**

The 27<sup>th</sup> ICAF meeting was held in Toulouse, France and was organized by Mr. Jean Rouchon, the French National Delegate, and his team. The meeting initiated with the two day 27<sup>th</sup> ICAF Conference (June 25<sup>th</sup>, 26<sup>th</sup>) followed by the 21<sup>st</sup> ICAF Symposium (June 27<sup>th</sup>-29<sup>th</sup>). There were over 280 attendees from 23 countries.

The Conference began with the General Secretary's Review followed by a Keynote Address by Ingenieur General de l'Armement Jean-Pierre Cornand, Delegation Generale pour l'Armement, Service of Aeronautical Programs, Rafale Programme Manager. The Keynote Address was followed by the presentation of the 12 National Reviews. The Reviews were compiled in the Minutes of the Conference and published by the Toulouse Aeronautical Test Center as ICAF Document 2288. The ICAF Conference Proceedings were published in electronic format and distributed on compact disc to all attendees. A limited number of paper versions were also distributed to National Delegates.

Following tradition, the Symposium opened with an invited Lecture in honour of the late founder of ICAF, Dr. Frederick J. Plantema. The ICAF Swedish National Delegate, Prof. Dr. Anders Blom of the Swedish Defence Research Agency gave the 18th Plantema Memorial Lecture and his chosen topic was 'Fatigue Science and Engineering – Achievements and Challenges'. Dr. Blom provided a history of significant events followed by a review of recent progress. He finished with a highly interesting discussion of future developments and trends, not just technically, but also from societal and financial perspectives. At the conclusion of his Lecture, Dr. Blom was presented with the Plantema Memorial Lecture Medal.

The 21<sup>st</sup> ICAF Symposium consisted of 32 presented papers plus an additional 37 papers in poster format. All papers have been included in the Proceedings of the Symposium entitled, 'Design for Durability in the Digital Age' edited by Mr. J. Rouchon, the French National Delegate. The Proceedings were published in two volumes by the Cepadues-Editions.

The 27th ICAF Meeting was an outstanding success both from the quality of the papers and from the social aspects. The host country provided an excellent venue for the formal sessions and was also generous in arranging events, including a very special cake, that celebrated the 50th Anniversary of the founding of ICAF.

### **ICAF DOCUMENT DISTRIBUTION**

The number of ICAF documents distributed between ICAF centers during the period May 2001 and April 2003 was 57, including reports, reprints, books and 7 proceedings consisting of more than 200 papers.

### **ICAF STATUS**

The International Committee on Aeronautical Fatigue (ICAF) is an informal organization with aircraft fatigue problems as the common basis for its activities. The committee consists of one General Secretary and a number of National Delegates, each representing a member country.

The objectives of ICAF are:

- a) to stimulate personal contacts between people, actively engaged in aircraft fatigue problems, and
- b) to exchange information, experience, opinions and ideas concerning aircraft fatigue problems.

The objectives are pursued by regular meetings and by exchange of ICAF documents (reports, publications and other documents).

ICAF continues to be a vibrant organization that is meeting these objectives. The Seattle ICAF meeting in 1999 and the Toulouse meeting in 2001 were both outstanding successes. The program for the Lucerne 2003 meeting has maintained the ICAF reputation for a strong relevant technical program in an atmosphere that encourages discussion and exchange. The 2005 meeting preparations for Hamburg, Germany have been initiated. In addition, reports continue to be exchanged on a regular basis and there are numerous informal exchanges between delegates during the

interval between meetings. ICAF also facilitated a 3 month sabbatical for Dr. C. Dalle Donne, the German National Delegate, with the National Research Council of Canada during 2002. The Secretary General is in correspondence with three additional nations who are seeking ICAF membership.

There are also challenges that ICAF must address including membership, effective use of advanced communication methods and changes in business operations that affect information exchange. These issues are being addressed.

## **IN MEMORIUM**



During the last two years, ICAF has lost two ardent supporters. **Mr. Andre Jordi**, ICAF National Delegate for Switzerland from 1979 to 1995 and vice-chairman of the ICAF Organizing Committee for this meeting, passed away in September of 2002. André was a very energetic person and committed to his work in the field of aeronautics. Over the years, he had broad responsibilities in Switzerland including Head of the Engineering Department, project lead of the MIRAGE fatigue tests, project leader of ARIANE, and project leader of the ADS 95 Ranger UAV project. His ICAF friends are grateful for André's valuable contributions to the ICAF organization and for his informative and enthusiastic delivery of the Swiss ICAF National Reviews.



In February of this year, ICAF lost one its most ardent participants, **Dr. John W. Lincoln** of the United States Air Force. On behalf of the National Delegates of the International Committee on Aeronautical Fatigue and myself, I wish to acknowledge the impact that Jack Lincoln had on the international stage. As I previously stated, ICAF is an informal organization with the stated objectives of stimulating personal contacts between people actively engaged in aircraft fatigue problems and exchanging information, experience, opinions and ideas concerning aircraft fatigue problems. By his actions, Jack demonstrated that these objectives were amongst his own. Jack Lincoln was delightful company and had a wonderful sense of humour. His timeless efforts to mentor individuals and to not only share his experiences, but to learn from the experiences of others, made him unique. Dr. Lincoln was also unique in his contributions to ICAF in that he presented a paper at every ICAF Symposium since 1985, including the 1997 Plantema Memorial Lecture. In addition, he contributed numerous other papers that were circulated as ICAF documents. He was one of the small team that developed the concept of the durability and damage tolerance approach to designing and managing fatigue and for over 30 years, led the United States Air Force and in many ways, the world community in the implementation of this approach. Simply put, Jack Lincoln influenced the way things are done related to structural integrity.

David L. Simpson  
General Secretary of ICAF

## **28<sup>TH</sup> ICAF CONFERENCE AGENDA**

**Monday, 5 May 2003**

**0800 – 1500      Registration**

**0900 – 0930      Welcome and Administrative Remarks**  
*M. Guillaume*, RUAG Aerospace

Conference Opening and ICAF General Secretary's Review  
Tribute to Mr. Jack Lincoln  
*D. L. Simpson*, National Research Council of Canada

### **SESSION A**

**Chairman: *A. Blom*, Swedish Defence Research Agency (FFA) (Sweden)**

**0930 – 1000      The Netherlands**

*H. Ottens*, National Aerospace Laboratory (NLR)

**1000 – 1030      Switzerland**

*M. Guillaume*, RUAG Aerospace

**1030 – 1100      Break**

### **SESSION B**

**Chairman: *J. Rudd*, Wright-Patterson Air Force Base (USA)**

**1100 – 1145      Germany**

*C. Dalle Donne*, German Aerospace Center (DLR)

**1145 – 1215      Italy**

*A. Salvetti*, University of Pisa

**1215 – 1345      Lunch**

### **SESSION C**

**Chairman: *A. Brot*, Israel Aircraft Industries (Israel)**

**1345 – 1430      France**

*J. Rouchon*, CEAT (Toulouse Aeronautical Test Center)

**1430 – 1515      Australia**

*G. Clark*, DSTO Platforms Sciences Laboratory

**1515 – 1545      Break**

**1545 – 1615      Sweden**

*A. Blom*, Swedish Defence Research Agency (FFA)

**1630                Close**

## 28<sup>TH</sup> ICAF CONFERENCE AGENDA

Tuesday, 6 May 2003

### SESSION D

Chairman: *H. Ottens*, National Aerospace Laboratory (NLR) (The Netherlands)

**0900 – 1000** The United States of America  
*J. Rudd*, Wright-Patterson Air Force Base

**1000 – 1030** Japan  
*A. Kobayashi*, The University of Tokyo

**1030 – 1100** Break

### SESSION E

Chairman: *J. Komorowski*, National Research Council of Canada (Canada)

**1100 – 1145** The United Kingdom  
*J. Moon*, QinetiQ Farnborough

**1145 – 1215** Israel  
*A. Brot*, Israel Aircraft Industries

**1215 – 1345** Lunch

### SESSION F

Chairman: *J. Rouchon*, CEAT (Toulouse Aeronautical Test Center) (France)

**1345 – 1430** Canada  
*J. Komorowski*, National Research Council of Canada

**1430 – 1500** Invited National Review  
Announcements Related to Technical Tours  
*M. Guillaume*, Conference Chairman

**1500 – 1530** Break

**1530 – 1900** Buses Depart to Technical Tours  
– RUAG Aerospace, F/A-18 Swiss Full Scale Fatigue Test  
– Pilatus Ltd., Military Trainer and PC-12 assembly lines  
(Both sites will be visited)

## 22<sup>ND</sup> ICAF SYMPOSIUM AGENDA

**Wednesday, 7 May 2003**

**0800 – 1500**

### **Registration**

**0830 – 0940**

Welcome and Administrative Remarks

*M. Guillaume*, RUAG Aerospace, Conference Chairman

Introduction of the Plantema Memorial Lecturer, *Prof. Jaap Schijve*

Plantema Memorial Lecture: Fibre Metal Laminates, the Development of a New Family of Hybrid Materials

*Prof. Ir. L. Boud Vogelesang*, Delft University of Technology, The Netherlands

Presentation of the Plantema Medal, *D. L. Simpson*, ICAF General Secretary

**0940 – 1010**

### **Break**

**1010 – 1030**

Introduction of the Keynote Speaker

*M. Guillaume*, Conference Chairman

Keynote Address

*Toni J. Wicki*, CEO RUAG, Switzerland

### **SESSION 1: Loads Development**

**Chairman: *J. Moon*, QinetiQ Farnborough (United Kingdom)**

**1030 – 1100**

A Dynamic Load Distribution Method for a Usage Spectrum Fatigue Test of a Fighter Aircraft Wing

*J. Weiss*, Engineering Consultant; *P. Kroese*, Bombardier Aerospace (Canada)

**1100 – 1130**

Development of a Parametric Aircraft Fatigue Monitoring System Using Artificial Neural Networks

*S. Reed, D. Cole*, QinetiQ Farnborough; *D. MacKay*, University of Cambridge (UK)

**1130 – 1215**

### **POSTER SESSION**

**1215 – 1345**

### **Lunch**

### **SESSION 2: Fatigue Damage Assessment**

**Chairman: *G. Clark*, DSTO Platforms Sciences Laboratory (Australia)**

**1345 – 1415**

Pilatus PC-12 – Fatigue Assessment of Production Damages in Pressure Dome

*D. R. Haenni, C. W. Innis*, Pilatus Aircraft (Switzerland)

### **SESSION 3: The Challenge of Full Scale Testing I**

**Chairman: *J. Komorowski*, National Research Council of Canada (Canada)**

**1415 – 1445**

Experiences with On-Line Data Trend Monitoring on a Full-Scale Aircraft Fatigue Test

*R. L. Hewitt, R. J. Hiscock*, National Research Council Canada (Canada)

**1445 – 1515**

A Modern and Efficient Full Scale Fatigue Test for the Swiss F/A-18

*F. Schwarberg, M. Hofstetter*, IABG mbH (Germany);

*Dr. M. Guillaume, I. Pfiffner*, RUAG Aerospace (Switzerland)

**1515 – 1545**

### **Break**

**1545 – 1615**

The Challenge of Conducting a Meaningful Full Scale Fatigue Test on a Transport Aircraft Empennage

*P. Jackson*, DSTO (Australia) *A. W. Cardrick*, Consultant (UK)

### **SESSION 4: Fatigue Behaviour of Aircraft Structures**

**Chairman: *C. Dalle Donne*, German Aerospace Center (DLR) (Germany)**

**1615 – 1645**

Fatigue Behaviour of Fuselage Panels with Welded Stiffeners

*L. Albugues, P. Rodrigo*, Airbus France (France)

**1645 – 1715**

A Critical Review of Strategies Used to Deal with Metal Fatigue

*R. G. Eastin*, Federal Aviation Administration (USA)

**1715 – 1745**

On the Probabilistic Fracture Mechanics Simulation of Fatigue Life and Crack Statistic for the Purpose of Damage Tolerance Assessment

*M. C. Escobedo Medina, H-J. Schmidt*, Airbus Deutschland; *Prof. D. D. Cioclov*, Fraunhofer Institut (Germany)

## 22<sup>ND</sup> ICAF SYMPOSIUM AGENDA

Thursday, 8 May 2003

### SESSION 5: Design of Composites

**Chairman: J. Rudd, Wright-Patterson Air Force Base (USA)**

**0800 – 0830** Advanced Durability and Damage Tolerance Design and Analysis Methods for Composite Structure  
*Dr. Ch. E. Harris, Dr. J. H. Starnes Jr., Dr. M. J. Shuart, NASA (USA)*

### SESSION 6: Design Development of New Aircraft

**Chairman: H. Ottens, National Aerospace Laboratory (The Netherlands)**

**0830 – 0900** Embraer New Family of Jets – Meeting the Current Fatigue and Damage Tolerance Requirements  
*W. Gonçalves, A. Pramono, C. E. Chaves, Embraer (Brasilien)*

**0900 – 0930** Fatigue Design Philosophy of the PC-21 Aircraft  
*M. Gottier, Engineering Consultant; J. Spichtig, Pilatus Aircraft Ltd. (CH)*

**0930 – 1000** POSTER SESSION

**1000 – 1030** Break

### SESSION 7: Fatigue Behaviour of Welded Structures

**Chairman: A. Salvetti, University of Pisa (Italy)**

**1030 – 1100** Fatigue and Fracture Behaviour of Friction Stir Welded Aluminium Alloy AA6056-T6  
*W. V. Vaidya, K. Angamuthu, V. Venzke, M. Kocak, GKSS Research Center; F. Palm, EADS Corporate Research Center (Germany)*

**1100 – 1130** Fatigue Properties of Friction Stir Welded Aluminium Butt Joints  
*C. Dalle Donne, G. Raimbeaux, German Aerospace Center (Germany)*

### SESSION 8: New Fatigue Design of Advanced Structures

**Chairman: A. Kobayashi, The University of Tokyo (Japan)**

**1130 – 1200** Cancelled

**1200 – 1330** Lunch

**1330 – 1400** Fatigue Crack Growth in D357-T6 and 2024-T3 under Variable Amplitude Loading and Validation of Fatigue Crack Growth Models  
*C. D. Glancey, Dr. R. Stephens, University of Idaho (USA)*

**1400 – 1430** Advanced Materials and Manufacturing Techniques on Future Airbus Aircraft  
*Dr. R. A. Collins, D. Campassens, Dr. S. T. Kimmins, P. Rodrigo, Airbus (UK)*

### SESSION 9: Damage Tolerance of Structures

**Chairman: A. Brot, Israel Aircraft Industries (Israel)**

**1430 – 1500** Characterization of Fatigue Behaviour of Aircraft Fuselage Structure  
*J. G. Bakuckas, C. A. Bigelow, P. W. Tan, FAA (USA)*

**1500 – 1530** Break

**1530 – 1600** Damage Tolerance of Fuselage Welded Stiffened Panels  
*B. Journet, F. Congourdeau, EADS CCR; C. Meyer, Airbus France (France)*

**1600 – 1630** A Procedure for Damage Tolerance Analysis of Pressurized Fuselage Structure under Local Over-Pressure  
*Dr. G. K. Das, Dr. M. Miller, The Boeing Company (USA)*

**1630 – 1700** Crack Growth of Corner Cracks at Offset Holes: Experimental Validation of Predictions from Commercial Codes  
*M. B. Heinemann, Alcoa Technical Center; W. J. Baumeister, N. C. Ramachandran, Cessna Aircraft Company (USA)*

## 22<sup>ND</sup> ICAF SYMPOSIUM AGENDA

Friday, 9 May 2003

### SESSION 10: Fatigue and Corrosion Damage

**Chairman: J. Rudd, Wright-Patterson Air Force Base (USA)**

**0830 – 0900**

Sliding a Fretting Model into Holistic Structural Assessment Methods

*C. L. Brooks, Dr. S. P. Domasky, APES, Inc., Dr. E. J. Tuegel, USAF AFRL (USA)*

**0900 – 0930**

A Review of Corrosion Fatigue and Corrosion/Fatigue Considerations in Aircraft Structural Design

*D. W. Hoeppner, University of Utah (USA)*

**0930 – 1000**

Fatigue Crack Propagation in Aluminium Alloys in the Presence of Corrosion Prevention Compounds

*K. Shankar, C. Purry, A. Fien, University of New South Wales (Australia)*

**1000 – 1030**

**Break**

### SESSION 11: Fatigue Models, Simulation and Correlation

**Chairman: A. Blom, Swedish Defence Research Agency (FFA) (Sweden)**

**1030 – 1100**

Stress Analysis of Mechanically Fastened Joints and Stress Intensity Factor Solutions for Countersunk Holes under General Loading

*J.J.M. de Rijck, Delft University of Technology (NL); S.A. Fawaz, USAFA (USA)*

**1100 – 1130**

Experimental Verification of Stress Intensity Factor Solutions for Corner Cracks at a Hole Subject to General Loading

*Dr. S. Fawaz, US Air Force (USA); B. Andersson, FFA/FOI (Sweden);*

*J. Newman, Mississippi State University (USA)*

**1130 – 1200**

Load History Effects during Fatigue Crack Propagation in Glare

*R. C. Alderliesten, H.J. M. Woerden, Delft University of Technology (NL)*

**1200 – 1330**

**Lunch**

### SESSION 12: The Challenge of Full Scale Testing II

**Chairman: J. Rouchon, CEAT (Toulouse Aeronautical Test Center) (F)**

**1330 – 1400**

Eurofighter Typhoon Production Major Airframe Fatigue Test

*M. Greenhalgh, BAE Systems, Warton (UK)*

**1400 – 1430**

Durability and Damage Tolerance Testing of the Joint Primary Aircraft Training System – Beech Model 3000 (T-6A Texan II)

*P. Gould, Raytheon Aircraft Company, Wichita (USA)*

### SESSION 13: Repair Solutions

**Chairman: G. Clark, DSTO Platforms Sciences Laboratory (Australia)**

**1430 – 1500**

"Compres": EU funded Multi-National Research Effort for Bonded Composite Repairs of Aging Commercial Aircraft

*A. Nathan, H. Leibovich, I. Kressel, Israel Aircraft Industries (Israel)*

**1500 – 1530**

**Break**

**1530 – 1600**

Metallic Riveted Repair Calculation

*B. Rosemberg, C. Meyer, Airbus France (France)*

**1600 – 1630**

Design Substantiation and Application of Boron-Epoxy Patch Repair on an F-16 Upper Fuselage Skin

*I. Kressel, G. Ghilai, S. Gali, N. Hackman, H. Leibovich, D. Peled, A. Brot, IAI Engineering Division; E. Grosu, I. Cohen, S. Jiny, Y. Meir, R. Halevi, L. Alon, A. Atzmoni, Israeli Air Force (Israel)*

**1630 – 1645**

Symposium Closure and ICAF 2005 Overview

*M. Guillaume, RUAG Aerospace, Conference Chairman*

## **ICAF General Secretary**

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