

General Secretary's Review
on the status and activities of the
International Committee on Aeronautical Fatigue and Structural Integrity (ICAF)
during the period June 2017 to May 2019

ICAF – the organization

The International Committee on Aeronautical Fatigue (ICAF) is an informal organization with aircraft fatigue and structural integrity problems as the common basis for its activities. The committee consists of a general secretary and the national delegates, each representing a member country. ICAF has no formal constitution or laws or funds. Its activities are possible only by the interest of the member countries and the activities of the national delegates and the general secretary.

The stated aims of ICAF are to encourage contacts between people actively engaged in aircraft structural integrity problems and to exchange information, experience, opinions and ideas concerning aeronautical fatigue and fatigue-related subjects. These objectives are pursued by biennial meetings and by the exchange of documents (technical reports, publications and other documents) if these are not available through other channels.

ICAF continues to be a vibrant organization that is meeting its objectives. The ICAF meetings consistently attract an audience from a variety of backgrounds, including representatives of industry, universities and institutes, regulatory agencies and commercial and military aircraft operators throughout the world. This, together with a strong relevant technical program, provides an atmosphere that encourages discussion and exchange. It is noted that participation in the ICAF meetings is open for anybody interested in the topics; attendance is not limited to specialists from the ICAF member countries.

ICAF is still growing. In 2017, after the presentation of their second national reviews (the first ones having been presented in Finland, in 2015), Brazil and Russia were voted in as full ICAF members. ICAF now consists of seventeen member countries.

ICAF – the 2017 meeting

The ICAF 2017 meeting was held in Nagoya, Japan, from June 5-9, 2017. It was organized by Prof. Nobuo Takeda - the then Japanese national delegate, and Mr. Shigeru Machida - the present delegate for Japan, and their team. The meeting started with the two-day 35th ICAF conference followed by the 29th ICAF symposium. Most of the 218 registered participants attended both the conference and the symposium, including the very last session on the very last day.

The conference began with welcome addresses by Prof. Teruo Kishi - president of the Innovative Structural Materials Association and science adviser to the foreign minister of Japan, Dr. Fumikazu Itoh - director general of the Aeronautical Technology Directorate of JAXA, and Mr. Yuichi Kitada - vice president of the Engineering & Maintenance Division of Japan Airlines. This was followed by the general secretary's review and the presentation of the 17 national reviews by the delegates of the fifteen ICAF member countries and the two candidate member countries, Brazil and Russia.

The symposium began with welcome addresses by Mr. Mitsuo Kawakami – director of the Airworthiness Division of the Civil Aviation Bureau, and Mr. Yasuhiro Toi - managing director of the Japan Aircraft Development Corporation. Following tradition, the symposium then continued with an invited lecture in honour of the late founder of ICAF, Dr. Frederick J. Plantema. The former Israeli national ICAF delegate, Mr. Abraham Brot gave the 26th Plantema Memorial Lecture, which was titled 'Three Faces of Aeronautical Fatigue'. In his lecture, Mr. Brot stressed and demonstrated the importance of proper statistical modelling in the computation of structural failure probabilities. The examples that he provided underscored the need for obtaining accurate and reliable input data for the structural risk analyses that are required nowadays by the

civil and military aviation authorities in the certification of airworthiness and continuing airworthiness. At the conclusion of his lecture, Mr. Brot was presented with the Plantema Memorial Lecture Medal.

The symposium consisted of 68 orally presented papers plus an additional 61 papers in poster format. All papers have been included in the ICAF 2017 proceedings. New symposium features that were introduced were the young researchers presentation session and the two-minute poster pitch presentation sessions; these aimed at improving ICAF's attractiveness to the new generation of researchers. A special lecture was provided by Dr. Anders Blom in his capacity as ICAF general secretary. His presentation was titled 'Some Experiences from 32 years of ICAF Attendance and Some Thoughts for the Future'. Dr. Blom provided an overview of significant past and current events and trends in relation to aeronautical fatigue and structural integrity. He finished with a discussion of new developments and perceived problems, not just technically, but also from societal and financial perspectives.

The last day of the symposium started with the presentation of the Jaap Schijve Award. This biennial award for young and talented researchers in the field of aeronautical fatigue and damage tolerance has been established in 2007 by the Netherlands Aerospace Centre NLR and Delft University in the Netherlands. Recognizing its promotional value, ICAF has kindly agreed to the idea to present the award on the last day of the ICAF symposium. The 2017 award recipient was Dr. Shu Minakuchi of the University of Tokyo, for his work on the modelling and monitoring of damage evolution in composite structures.

The last day of the symposium featured two streams of parallel presentation sessions. In 2015 it was observed that a number of authors had refrained from attending the ICAF meeting because their papers were accepted for the poster session, and not for oral presentation. It was felt that an increased opportunity for 'getting on the stage' would attract more participants and it was decided to introduce this approach in 2017, albeit on a limited scale and provided that the themes of the competing parallel sessions would be very different.

The ICAF 2017 meeting was very successful, 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, which included an excursion to the Mitsubishi Aircraft Corporation and a reception at the Tokugawa Art Museum.

The national reviews and the symposium papers were compiled in the ICAF 2017 proceedings and published by the local organizing committee in electronic format. The proceedings were distributed on USB flash drive to all attendees. They are also available through Curran Associates, Inc. This publisher was granted the non-exclusive permission to produce printed copies. This has been done in order to improve the accessibility of the proceedings and the exposure that ICAF and the contributing authors have.

ICAF – the people

On the last day of the ICAF 2017 symposium Dr. Anders Blom has resigned as general secretary. He had held this position since 2005. From 1985 to 2005 he was the national ICAF delegate for Sweden. As his successor I thank Anders for all the work he has done for ICAF and for having been an ardent ICAF supporter for more than 32 years.

During the last two years a few changes have been made amongst the national delegates as well. I would like to welcome the following new delegates to ICAF: Mr. Shigeru Machida, Japan, Dr. Zlatan Kapidzic, Sweden, Dr. David Hallam, UK, Dr. Carlos Chaves, Brazil, Dr. Boris Nesterenko, Russia, and my successor Dr. René Alderliesten, The Netherlands.

At the same time I would like to thank the predecessors of the first three new delegates, Prof. Nobua Takeda, Mr. Hans Ansell, and Dr. Steve Reed, for all their valuable contributions to ICAF over the years.

ICAF – its recognition

In 2018 ICAF has received the distinguished ICAS Von Karman Award for International Collaboration in Aeronautics, in recognition of ICAF's multi-national world-wide work over almost seven decades that has

contributed to the safe flight of both civil and military aircraft. The award was established in 1980 in memory of Theodore von Karman, a leading figure in the foundation of ICAS, the International Council of the Aeronautical Sciences, and an outstanding proponent of international collaboration in the aeronautical sciences.

The purpose of the award is to acknowledge exceptional achievement in international cooperation in the field of aeronautics. It is presented to a project, or programme, in which two, or more, countries are major participants and which is characterised by substantial technical achievement, scientific or technological advance or benefit to society. The list of previous recipients includes the Boeing 787, the Airbus A350 and the Airbus A380 programmes, GARTEUR, ACARE, and HiFire and twelve other remarkable programmes and organizations. Being on that list truly is an honour!

The medal and the associated certificate have been presented to us on 12 September last. This was done during the ICAS 2018 Congress in Belo Horizonte, Brazil, after the ICAS Von Karman Lecture by two former ICAF general secretaries, Anders Blom and David Simpson, the national ICAF delegate for Brazil, Carlos Chaves, and myself. The Swiss national delegate, Michel Guillaume, was present in the audience.

ICAF – the future

There is no doubt that aeronautical fatigue and, more generally, structural integrity will remain challenging topics. The aviation industry will soon be, or is being, forced to come up with disruptive solutions in order to be able to meet the targets that are now set for emission and noise reductions. The ACARE goals for 2050 are 75% less CO₂, 90% less NO_x, and 65% less perceived noise, relative to the year 2000. Although industry and institutes are working on more fuel-efficient and less polluting turbofan and turboprop engines, the result is negated by the annual growth of passenger kilometres by 5% or more per year. Nobody knows yet for sure what the final solution will be. No matter what, whether it will be a fully integrated distributed hybrid turbo-electric propulsion system, or propulsion based on hydrogen, ammonia or nuclear energy, it will be combined with a highly optimized low-weight non-traditional airframe made from ultrahigh performance materials using non-traditional, financially competitive manufacturing and assembly technologies. This will certainly entail fatigue and other structural integrity issues, which will need to be dealt with by well-educated and well-informed engineers and researchers, in order to keep structural risks at acceptably low levels. ICAF will therefore remain as relevant as ever.

Be that as it may, there are other challenges that ICAF must address, including membership, effective use of contemporary communication methods (we still do not have a permanent website), copyright issues that affect information exchange and existential questions such as 'do we need to change the way we present the national reviews?', in order to remain relevant. These issues and questions are being addressed.

Marcel. J. Bos
General Secretary of ICAF
28 May 2019