International Civil Aviation Organization

A42-WP/258
TE/99
29/7/25

WORKING PAPER

ASSEMBLY — 42ND SESSION

TECHNICAL COMMISSION

Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

FATIGUE MANAGEMENT

(Presented by Oman, Bolivia (Plurinational State of), the International Federation of Air Line Pilots' Associations (IFALPA), the International Transport Workers' Federation (ITF), the International Business Aviation Council (IBAC), and co-sponsored by Dominican Republic and the International Federation of Air Traffic Controllers Associations (IFATCA))

EXECUTIVE SUMMARY

ICAO recognizes the importance of fatigue management in Annex 6 — *Operation of Aircraft* and supporting guidance material. The effective management of crew fatigue is essential for the preservation of operational aviation safety. There remain challenges in the effective implementation of fatigue management.

As the understanding of the science of sleep and fatigue progresses, it is important that the provisions and guidance material for fatigue management are reviewed and revised. Updated provisions and guidance material are expected to enable the harmonized implementation of a scientific approach to fatigue management across all Member States. These updates have potential to provide structure for oversight authorities and service providers to support the implementation and assessment of fatigue management approaches, including performance-based approaches.

Action: The Assembly is invited to:

a) acknowledge the importance of effective implementation of fatigue management as a critical component to reduce risk and achieve safe operations;
b) request ICAO to conduct an expert review sector specific guidance material, scientific principles definitions, knowledge and operational experience to harmonize the understanding, implementation, and assessment of fatigue management. Based on this review, update the *Manual for the Oversight of Fatigue Management Approaches* (Doc 9966) as needed with additional guidance for oversight authorities; and
c) recognize that the implementation of effective performance-based approaches to fatigue management requires appropriate resourcing and a strong knowledge base to be created within service providers, regulators, front-line workers and their representatives.

Strategic Goals:	This working paper relates to the Strategic Goals *Every Flight is Safe and Secure;* and *No Country Left Behind*.

Financial implications:	The ICAO activities referred to in this paper are expected to be undertaken within the resources available in the 2026-2028 Regular Programme Budget and/or from extra budgetary contributions as guided by the ICAO Business Plan 2026-2028.
References:	Annex 6 — *Operation of Aircraft*, Parts I — *International Commercial Air Transport — Aeroplanes*, Part II — *International General Aviation — Aeroplanes* and Part III — *International Operations — Helicopters* Annex 11 — *Air Traffic Services* Doc. 9966, *Manual for the Oversight of Fatigue Management Approaches* Fatigue Management Guide for Airline Operators; Fatigue Management Guide for General Aviation Operators of Large and Turbojet Aeroplanes; Fatigue Management Guide for Air Traffic Service Providers; Fatigue Management Guide for Helicopter Operators.

1. INTRODUCTION

1.1 Fatigue is a hazard that degrades human performance and cannot be eliminated, therefore must be actively managed. The need to manage fatigue risks is recognized in Annex 6 — *Operation of Aircraft*, Annex 11 — *Air Traffic Services*, the *Manual for the Oversight of Fatigue Management Approaches* (Doc. 9966) and the supporting sector specific fatigue management implementation guides.

1.2 Both the prescriptive and performance-based approaches to fatigue management provided for in Annex 6 and Annex 11 require continuous improvement. Similarly, the Standard and Recommended Practices (SARPs) and guidance material require periodic review to account for changing operational environments, operational experience of service providers and crew members, advances in understanding of the science of fatigue, and fatigue management. Therefore, the reestablishment of expert groups to review the existing ICAO fatigue management publications is necessary.

2. DISCUSSION

2.1 It has been observed that there are challenges between the intention of the fatigue management provisions and guidance material and the practical implementation. Currently the guidance material provides science and the reasons (the "what and why") but is limited with regards to practical implementation methods (the "how"). Updating the guidance material will support the integration of lessons learnt from the industry to be captured and shared and applied as appropriate to their operational context.

2.2 States and service providers would benefit from additional guidance on topics such as:

a) fatigue hazard quantification; understanding the level of fatigue at which it becomes a concern for flight safety;

b) fatigue data analysis and mitigation implementation; understanding effective methods to interpret fatigue data and develop appropriate mitigations;

c) safety performance indicators (SPIs); assistance in developing and revising metrics for monitoring the effectiveness of fatigue management approaches;

d) fatigue management training; e.g. how to develop a robust training approach to improve understanding of fatigue science, improve decision making and fatigue reporting; and

e) structured assessment of fatigue management approaches; both for the use of safety management system (SMS) in support of prescriptive approaches and how to evaluate performance-based approaches for safety equivalence to, or better than, that achieved through the prescriptive fatigue management approaches.

2.3 Service providers would benefit from the further development of fatigue management guidance to address practical challenges, which would assist in better application of resources.

2.4 The improvement of the guidance material would enable more effective oversight and reduce the challenge of resource allocation by regulators, particularly for those who have implemented performance-based fatigue management approaches.

2.5 Understanding of the application of fatigue science within the operational environment continues to evolve. There is a need for expert groups to review the current fatigue management guidance to address these developments and provide more up to date methods and approaches. The balance between fatigue management requirements and the industry's ability to practically implement the requirements is a key issue that needs to be addressed by the expert groups.

2.6 Various approaches to fatigue management are offered through the existing SARPs: prescriptive fatigue management regulations, within a set framework of fatigue limits supported by the service provider’s SMS, a blend of prescriptive limitations and fatigue risk management system (FRMS), and that of FRMS. Operational experience has demonstrated that the application of all approaches requires technical expertise by both oversight authorities and service providers.

2.7 There is a need for additional guidance for service providers and oversight authorities to enable resource allocation for safe implementation of fatigue management under both the SMS and FRMS approaches. This guidance would facilitate the harmonization of fatigue management approaches across all States and support the principle of No Country Left Behind.

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