



Fatigue Risk Management Systems (FRMS)

White paper

Introduction

ICAO defines fatigue as “a physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person’s alertness and ability to perform safety related operational duties.”

The traditional regulatory approach to managing aircrew fatigue has been to prescribe limits on maximum flight and duty hours and required minimum breaks within and between duty periods. It is a one-size-fits-all approach that does not account for operational differences. It is widely accepted that following the prescriptive rules alone does not necessarily support safe operation. Conversely, there may exist operationally efficient rostering patterns which, while not allowed according to the relevant prescriptive rules, are sufficiently aligned with human physiology to allow for an acceptable level of safety with appropriate mitigations.

A Fatigue Risk Management System (FRMS) is an enhancement to flight and duty time limitations (FTLs), enabling an operator to customize FTLs to better manage fatigue risk to the operation. There is scientific and operational support that FRMS will become a means for effectively mitigating fatigue risks.

All States are currently required to have prescriptive regulations (FTLs) for fatigue management. This requirement will continue whether they choose to implement regulations for an FRMS or not.

All operators will need to manage the safety risks stemming from personnel fatigue under their Safety Management System (SMS) even if their state doesn’t provide for or they don’t choose to implement an FRMS. They may benefit from adding selected operational FRMS processes into their SMS and building the FRMS capabilities, competencies, and maturity incrementally. Not every operator can or should implement a full FRMS.

ICAO Doc 9966 Manual for the Oversight of Fatigue Management Approaches provides detailed information for States on implementing FRMS. The ICAO, IATA and IFALPA joint publication *Fatigue Management Guide for Airline Operators* includes complementing information for airlines.

What is FRMS?

ICAO defines an FRMS as “a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles, knowledge and operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.”

The four scientific principles on fatigue management relate directly to fatigue causes and describe the relevant human physiological limitations as follows:

1. Periods of wake need to be limited. Getting enough sleep (both quantity and quality) on a regular basis is essential for restoring the brain and body.
2. Reducing the amount or the quality of sleep, even for a single night, decreases the ability to function and increases sleepiness the next day.



3. The circadian body clock affects the timing and quality of sleep and produces daily highs and lows in performance on various tasks.
4. Workload can contribute to an individual's level of fatigue. Low workload may unmask physiological sleepiness while high workload may exceed the capacity of a fatigued individual.

FRMS, by applying the SMS principles on risk identification, assessment and monitoring while understanding and respecting the human physiological limitations above, provides a performance-based approach to manage safety risks arising from human fatigue.

Like SMS, FRMS seeks to achieve a realistic balance between safety, productivity and cost by better understanding and therefore more efficiently managing the relevant risks.

An effective FRMS is manifested with duty assignments, rest periods and rosters that balance the crewmembers' ability to perform their assigned duties safely with operator's commercial needs. The fatigue risk is a combination of task requirements, expected fatigue impairment of an average responsible crewmember performing those tasks, the frequency they are exposed to those conditions, and the recovery opportunities provided. Effective fatigue risk mitigations are aimed at addressing the causes of fatigue and recovery from it according to the relevant scientific principles.

Shared responsibility in FRMS

The *Fatigue Management Guide for Airline Operators* is a result of the combined efforts of ICAO, IATA and IFALPA, representing the three parties to FRMS: the regulator, the operator and the crewmember. Trust between all parties is vital to ensure the success of FRMS.

A key feature of FRMS is that responsibility for managing fatigue risks is shared between operators and individual crewmembers. The operators provide the framework in terms of duties, rosters and rest periods, while crewmembers have a responsibility to use their rest periods effectively and report for duty fit for the following assignment.

As in SMS, the FRMS relies on the concept of an effective reporting culture with active involvement of all stakeholders where personnel are constantly encouraged to report hazards whenever observed in the operational environment for the attainment of optimum safety levels and a continuous improvement program.

What are the benefits of FRMS?

Generic prescriptive regulations (FTLs) may not address operational peculiarities and complexities. FRMS policies and procedures focus on the operator's specific operations (e.g. business model, route network, flight schedule structure, geographical location, operational environment, crew scheduling practices, etc.). Therefore, an FRMS allows an operator to adapt policies, procedures and practices to the specific conditions that result in fatigue risk in a particular aviation setting. Operators may tailor their FRMS to meet their unique operational demands and focus on fatigue mitigation strategies that are specific to their operational environment.

Understanding and respecting human limitations allows an operator to align its roster planning and related fatigue mitigations with human physiology whilst at the same time maintaining or even improving operational efficiency. This allows the operator to protect its operation and its people from undue fatigue exposure every day.

In addition to fatigue mitigation, some of the benefits of an FRMS may be:

- A reduction in fatigue-related errors, incidents and accidents – which may be associated with financial costs and/or impact an operator's reputation.



- Improved operational efficiency – tailored approaches to fatigue management including approved deviations from prescriptive rules supported by robust safety cases may improve efficiency.
- Reduced absenteeism – operators may notice a decrease in sickness and other absences which were related to fatigue.
- Attracting and retaining crew – ‘fatigue friendly’ rosters may attract and retain crew as a result of improved work/life balance. Fatigue at work is more effectively managed, increasing morale.

Summary

FRMS provides a performance-based regulatory approach which defines requirements for operators to manage fatigue risk, rather than only prescribing FTLs that may not consider aspects specific to the organisation or operating environment.