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FATIGUE MANAGEMENT OF WORKLOAD IN HELICOPTER OPERATIONS

Introduction

The management of Flight Crew Member (FCM) fatigue is based upon 4 Scientific Principles that are defined by the International Civil Aviation Organisation (ICAO). The fourth of these 4 Scientific Principles addresses the influence of workload on fatigue and performance:

> SCIENTIFIC PRINCIPLE 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.

The Civil Aviation Safety Authority (CASA) replicates the 4 Scientific Principles into guidance material and has drawn upon them for the basis of the fatigue management regulations. However, CASA has also implemented a specific difference which extinguishes the main means of addressing Scientific Principle 4 in rotary wing operations that must be addressed.

Context & Background

The management of the fatigue risk of workload is primarily achieved only indirectly by limiting the length of the overall Flight Duty Period (FDP) when there is an increase in the number of sectors flown in that FDP. This is based on a recognition that typically the initial and later stages of a flight are comparatively higher in workload and when these phases of flight can be limited in an FDP, it also creates a means to mitigate the effects of workload accumulation.

ICAO Doc 9966 (Chapter 2.4) notes that research has been conducted into the relationship between the number of sectors and the association of workload, with a causation linkage established. While some rotary wing operations do have workload accumulate in this manner, there are also many examples where the lower workload cruise phases of flight are also filled with workload with ICAO acknowledging that some:

> "…helicopter operations do not necessarily have a low workload cruise period and the entire flight can be cognitively demanding".

The Australian Context & Regulations

AusALPA recognises the differences in rotary wing operations and that the above methodology of managing workload through FDP length reductions aren't useful in some rotary wing operations. However, we assert that the removal of FDP length reductions for all types of rotary wing operations is inappropriate and certainly should not have resulted in a complete absence of a regulated means to address workload for all types of rotary wing operations.

The Civil Aviation Order (CAO) 48.1 Instrument 2019 definition of "sector" means that the reduction of FDP length per increase in sectors does not apply to rotary wing operations.

CAO 48.1 states that Sector has the following meanings:

(a) **except for a rotorcraft** — any flight consisting of a take-off and a landing, when conducted by a person in the capacity of an FCM;
(b) **for a rotorcraft — the period**:
    (i) from when the rotor blades start turning until they stop turning; and
    (ii) during which an FCM on the rotorcraft conducts 1 or more flights, each consisting of a take-off and a landing;
(c) each hour, or each part of an hour, of an FDP spent in a synthetic training device.

[Emphasis added]

Many rotary wing operations contain a series of flights where there is no intervening period of rotor blade shutdown and with this definition, a sector is more continuous than that in fixed wing operations. Additionally, "hot-refuelling" operations are typical for many rotary wing operations, meaning shutdown does not occur and many flights can occur in "the period".

With sectors being defined related to whether the rotors are shutdown or not, and the reduction of FDP length only occurring with 3 or more sectors (for a given FDP start time), for all intents and purpose, there is no reduction in FDP length when this definition of sectors is applied.

Also, CAO 48.1 has no provision for addressing workload related to "the period" either.

Addressing Workload Through Alternative Means

There are a number of viable examples for CASA and industry to draw upon in order to rectify the absence of regulating workload in rotary wing operations. AusALPA believes that a multi-faceted approach may be the most suitable means given the different ways Scientific Principle 4 can affect different types of rotary wing operations.

The following four example sources provide an overview of the alternatives possible. They are articulated in more detail in the appendix to this paper:

1. Utilise *"time on task" methods* from flight training and Air Traffic Control examples of fatigue management.
2. Draw upon the work done in reviewing CASR Part 172 related to reforms including, *maximum time in position and minimum breaks baseline requirements*.
3. Where appropriate, *alter the definition of "sectors*" and replicate the way fixed wing operations are regulated.
4. Adapt and *apply the example from the United Kingdom Civil Aviation Authority* CAP-371 into the Australian regulations and associated guidance material.

Position

It is AusALPA's position that the current FCM fatigue management regulations require reform to rectify the absence of fatigue risk management of workload in rotary wing operations.

AusALPA believes that these reforms should draw upon examples of how workload related fatigue risks have been managed in other jurisdictions and other parts of the aviation industry.

All rotary wing fatigue management tripartite stakeholders (regulator, operators, pilots) have a shared responsibility to ensure FCM fatigue management standards include all 4 Scientific Principles and do so for all types of flying. The ICAO documents do not state that workload related fatigue is absent for rotary wing operations, they merely point out that it is different and more continuous in many instances.

AusALPA is seeking CASA to reestablish a fatigue management working group process and consultation that includes this topic area of FCM workload in rotary wing operations.

Appendix – Existing Examples to Benchmark

AusALPA believes that there are a number of viable means and examples for CASA and other stakeholders to draw upon in order to rectify the absence of regulating workload for rotary wing operations.

1. Time on task and ATC

ICAO Doc 9966 (Chapter 2.4) is where the differences between fixed wing and rotary wing workload management is raised but it also points to the study conducted with ATC and the relationship between:

> "…workload and time-on-task having interactive effects on fatigue."

CAO 48.1 already has a time-on-task related means to manage the effects noted in Scientific Principle 4. An example related means of this type of mitigation can be found in CAO 48.1 Appendix 4, replicated here:

> 2.2 An FCM must not be assigned or commence flight time for flight training during an FDP unless the flight training is conducted during the first 7 hours of the FDP's flight time.

The training environment shares some characteristics typical for many rotary wing operations in that both tend to have more continuous workload for most of the flight. Similarly, the operational environment of an ATC is relatively absent of a lower workload "cruise period".

2. CASA's Development of Air Traffic Service fatigue management standards

CASA has been conducting a Post Implementation Review of Part 172 of the CASRs and an interim summary of consultation (addressing only the feedback provided in relation to the fatigue management proposals) is informative for how amendments for FCM rotary wing operations regulations could progress to resolve the outstanding workload issue. In response to the consultation feedback, CASA identified a number of reform opportunities, including:

> "…we will include maximum time in position and minimum breaks baseline requirements…"

We believe that the concept of maximum time in position balanced with minimum break times, is a useful means to address workload factors in the absence of limiting FDP with an increase in sectors. Given that CASA is already accepting of this concept for air traffic controllers, there is merit for applying it to other areas such as for rotary wing operations.

3. Replicate Fixed Wing Operations

Many rotary wing operations do have a workload pattern (high-lower-high) similar to typical fixed wing point-to-point operations. For these type of rotary wing operations, there should be no controversy to use the existing means of managing workload through the reduction of FDP length with an increase in sectors. After careful consideration for how this would be defined, there should be no reason that this can't be applied in a vast number of existing rotary wing operations.

4. UK CAP 371 example

The UK CAA CAP 371 is an example of recognition of both a need to recognise the operational differences between fixed wing operations and rotary wing operations and how to address the differences in the associated workload issues. Essentially, this is achieved through specifying:

- maximum limitations for both flight duty and flying hours; and
- limitations for time-on-task with associate minimum break times.

The following relevant extracts from CAP 371 are informative:

Section 23: Limits on Helicopter Flying

Table D Maximum FDP – Helicopters

Local time of start	SINGLE PILOT		TWO PILOTS	
	Max. Length of Flying Duty Period (Hours)	Max. Length of Flying Time (Hours)	Max. Length of Flying Duty Period (Hours)	Max. Length of Flying Time (Hours)
0600-0659	9	6	10	7
0700-0759	10	7	11	8
0800-1359	10	7	12	8
1400-2159	9	6	10	7
2200-0559	8	5	9	6

Repetitive Short Sectors

Crew flying repetitive short sectors, for example pleasure flying, offshore short sector shuttles, at an average rate of 10 or more landings per hour, shall have a break of at least 30 minutes away from the helicopter within any continuous period of 3 hours.

When carrying out the more demanding roles of helicopter flying, for example, winching and external load carrying, operators shall specify maximum periods of continuous operation. The limits set shall not exceed the maximum allowed in subparagraph 23.2.1 but depending on the nature and circumstances of a particular operation may need to be more restrictive.

This CAP demonstrates that it is possible to provide standards for rotary wing that differ to fixed wing operations and is a useful means to address workload factors in the Australian context where a limiting of FDP with an increase in sectors is not the most appropriate method.