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WORKING PAPER

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ASSEMBLY — 38TH SESSION

TECHNICAL COMMISSION

Agenda Item 38: Other issues to be considered by the Technical Commission

USING THE FLIGHT DATA MONITORING SYSTEM TO JUSTIFY BIO-MATHEMATICAL FATIGUE MODELS

(Presented by Turkey)

EXECUTIVE SUMMARY

Fatigue is considered to be one of the most critical hazards in aviation industry. Fatigue risk management system (FRMS), organizations have been trying to manage this problem through a more systematic approach. Various bio-mathematical models are claimed to be able to assess the level of crew fatigue. This paper reports a study done by a private airline in Turkey to make sure these models' results correlate with their (FDM) reports, in order to help organizations' safety departments justify their expenditure on such models.

Action: The Assembly is invited to:
a) note the information presented in this paper;
b) encourage Member States to make the use of FRMS more feasible, by giving support to studies of the kind described here, and to strengthen FDM's current state by licensing the human resource.

Strategic Objectives:	This working paper relates to the Safety Strategic Objective.
Financial implications:	Not applicable.
References:	Doc 9966, *Fatigue Risk Management Systems — Manual for Regulators*

1. INTRODUCTION: FATIGUE AND FRMS

1.1 ICAO Doc 9966 **—** *Fatigue Risk Management Systems — Manual for Regulators* describes fatigue as a major human factors hazard because it affects most aspects of a crew member's ability to do his or her job. Fatigue risk management systems (FRMS) bring forward a systematic approach to effectively manage and minimize this hazard.

1.2 One of the hazard identification techniques that can be used for fatigue is a bio-mathematical model. Like flight data monitoring (FDM), these models have the benefit of objectivity. But Doc 9666 also states that "the cost and complexity of an FRMS may not be justified for operations that remain inside the flight and duty time limits and where fatigue-related risk is low."

2. BIO-MATHEMATICAL MODELS

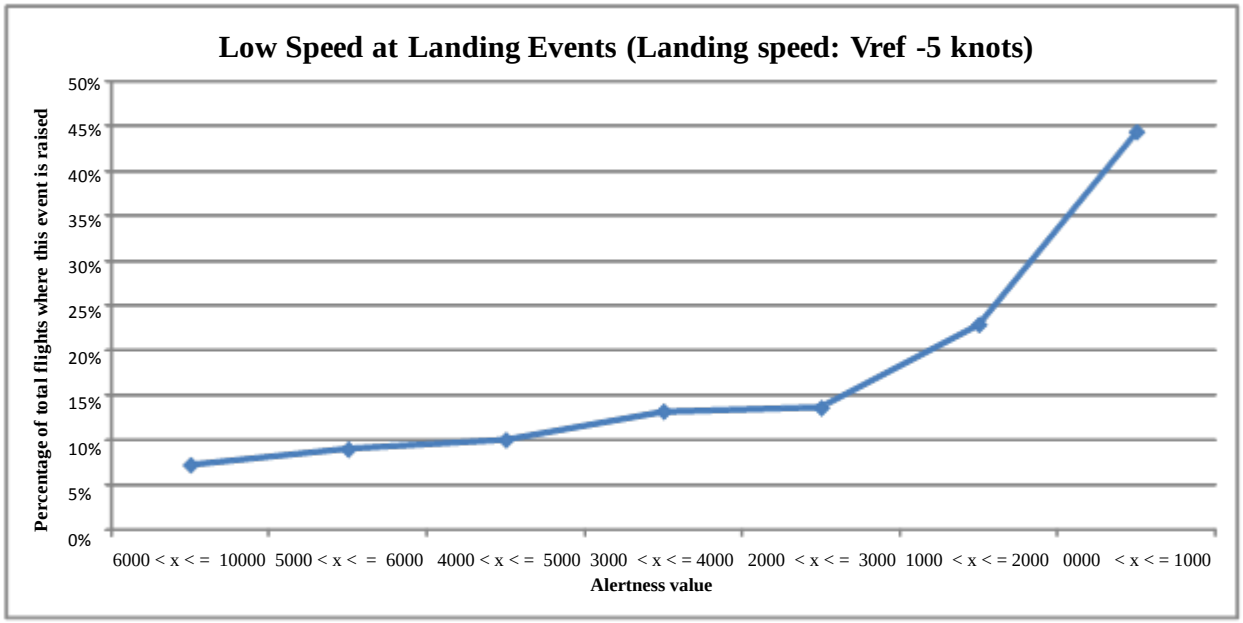
2.1 Bio-mathematical models help companies understand their staff members' fatigue levels by transforming complex fatigue information into comparable data.

2.2 Although these data may be easy to grasp and compare, there still remains a question for companies regarding its credibility. In today's competitive environment, companies need to be more effective than ever, thus making safety departments' job harder where it is a matter of pursuing non-obligatory improvements.

3. CORRELATION WITH FDM

3.1 A study has been undertaken by the safety department of a Turkish airline to establish whether the 'alertness values' of a specific model works as claimed. As part of this, another objective tool - FDM - was used with alertness values imported from the mathematical model and various events imported from the FDM system being compared. Data from 9,746 flights were used.

3.2 The result can be seen in the graph below. Each column in the horizontal axis represents an alertness value range. For example, 0000 < x < 1000 represent flights where the alertness values are between 0 and 1000, thus the most dangerous.



3.3 As can be seen in the graph, low speed at landing events increase with decreasing alertness (i.e. increased fatigue). This graph had been helpful for the safety department of the airline to justify the project to their board members.

3.4 It should be noted that this study is a work in progress, and needs much more data and effort to become widely approved.

4. CONCLUSION

4.1 Objective studies are one of the key elements of scientific improvement. To maintain sustainable growth, the airline industry needs to maintain continuous improvements in safety, using objective tools which are few in number. Using these tools, especially FDM, requires experience and expertise. Although they can be powerful in the right hands, as can be seen in this study, such tools can be misleading when used incorrectly.

4.2 It should be Member States' responsibility to encourage operators to use these tools and make sure they do so correctly by licensing the human resource.

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