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RUNWAY INCURSION PREVENTION PROGRAMME

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Aerodrome Safety Publications are published by the CAAS for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Manual of Aerodrome Standards. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

1 Purpose

- 1.1 The purpose of this Aerodrome Safety Publication (ASP) is to promulgate supplementary guidance material to aerodrome operators on runway incursion prevention programme vis-a-vis facilities, equipment and procedures including integration of markings, lights and signs as a whole into the runway incursion prevention plan, taking into account different traffic intensities and visibility conditions at the aerodromes. This ASP provides guidance on what is acceptable to the Aerodrome and Air Navigation Services Regulation (AAR) Division with regard to the requirement in the Manual of Aerodrome Standards (MOAS), Appendix E, Section 4.18 – Runway Incursion Prevention.
- 1.2 This ASP recommends and explains parts of a runway incursion prevention programme, in particular; visual aids, use of technology and airside driving. By considering the suggested parts, the aerodrome operator should be able to establish a runway incursion prevention programme for its aerodrome if they have not established one.

2 Applicability

- 2.1 This ASP applies to all aerodrome operators certified under paragraph 67 of the Singapore Air Navigation Order (ANO). Aerodrome operators should examine each item carefully, by considering the size, complexity and scope of operations at the aerodrome to determine what applies.

3 Cancellation

- 3.1 This ASP supersedes ASP 03/2010.

4 Effective Date

- 4.1 This ASP takes effect on 5 April 2017.

5 Introduction

- 5.1 Runway incursion is defined in the Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM, ICAO Doc 4444) as:

“Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.”

- 5.2 Runway safety is vital to the safety of aircraft operations at an aerodrome. While runway safety encompasses many areas which include issues such as foreign object debris and wildlife straying onto the runway and other

logistical deficiencies, it is critical that increasing emphasis has to be placed on runway incursion prevention as air traffic volume increases.

- 5.3 Studies have shown that that runway incursions increase exponentially with respect to an increase in air traffic volume and runway incursions have sometimes resulted in serious accidents with significant loss of life. An example of a serious accident would be the one which occurred on 8 October 2001, at Linate airport in Milan, Italy, where all 114 people onboard the two aircraft were killed.
- 5.4 One of the many contributory factors to a runway incursion is airside vehicle drivers. The most common driver-related factors identified in several studies are:
- (a) Failure to obtain clearance to enter the runway;
 - (b) Failure to comply with ATC instructions;
 - (c) Inaccurate reporting of position to ATC;
 - (d) Communication errors;
 - (e) Inadequate training of airside drivers;
 - (f) Absence of radiotelephony equipment;
 - (g) Absence of radiotelephony training;
 - (h) Lack of familiarization with the aerodrome;
 - (i) Lack of knowledge of aerodrome markings, lights and signs; and
 - (j) Lack of aerodrome maps for reference in airside vehicles.
- 5.5 A runway incursion prevention programme should aim to remove hazards and minimize the residual risk of runway incursions and to reduce active failures and the severity of their consequences.

6 Objective

- 6.1 The objective of a runway incursion control programme is for the aerodrome operators to put in place a plan to assess runway incursion, the impact of runway incursion and reduce the number of runway incursions at their aerodromes. The following are recommended elements for such programme:
- (a) Establishment and continual operation of a runway safety team/group in accordance with its terms of reference;
 - (b) Data collection and data analysis through reporting by relevant parties/ personnel, investigations, etc;
 - (b) Ensuring aerodrome visual aids such as markings, lights, signs and airside related procedures relating to runway operation in compliance with MOAS technical requirements;

- (c) Use of technology including advanced surface movement guidance control system (A-SMGCS), advanced multilateration system¹ and microwave detection systems;
- (d) Training of airside drivers and other personnel;
- (e) Runway incursion prevention awareness campaigns for airside drivers and other personnel who are involved in runway operations; and
- (f) Other recommendations applicable to ensure safe operations of aircraft within the aerodrome with respect to runway incursions.

7 Establishment and Maintenance of a Runway Safety Team

7.1 A runway incursion prevention programme should start with the establishment of runway safety teams at aerodromes. The primary role of the runway safety team should be to develop an action plan for runway safety, advise management as appropriate on potential runway incursion issues and recommend strategies for hazard removal and mitigation of the residual risk. These strategies may be developed based on local occurrences or best practices or combined with information collected elsewhere.

7.2 This team should also:

- (a) Verify the compliance of markings, lights and signs with the MOAS, visible to airside drivers and other users;
- (b) Identify potential new technologies that may reduce the possibility of a runway incursion;
- (c) Ensure the compliance of airside related procedures with the MOAS;
- (d) Develop and distribute runway safety educational and training material to airside drivers and other users, as necessary; and
- (e) Identify and chart hot spots or problems areas at the aerodrome through outcome of investigation reports, international best practices or any other methods.

8 Data Collection and Analysis

8.1 ICAO defined a hot spot as

“A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary”

¹ The Multilateration System is a surveillance system which is able to detect and identify all Mode S equipped aircraft and vehicles moving on the aerodrome movement area even during bad weather conditions such as heavy rain.

- 8.2 The criteria used to establish and chart a hot spot are contained in the PANS-ATM (Chapter 7) and Annex 4 - Aeronautical Charts (Chapters 13, 14 and 15, and Appendix 2). Aerodrome charts showing hot spots should be produced locally, checked regularly for accuracy, revised as needed, distributed locally, and published in the Aeronautical Information Publication (AIP).
- 8.3 Once hot spots have been identified and charted, suitable strategies should be implemented to remove the hazard and, when this is not immediately possible, to manage and mitigate the risk. These strategies may include:
- (a) Awareness campaigns;
 - (b) Additional visual aids (markings, lights and signs);
 - (c) Use of alternative routings;
 - (d) Construction of new taxiways; and
 - (e) Mitigation of blind spots in the aerodrome control tower.

9 Compliance with the MOAS

- 9.1 Visual aids viz. markings, lights and signs and airside-related procedures, provide critical information and guidance to airside drivers and other users at an aerodrome. The aerodrome operator should ensure that the implementation of visual aids and procedures in the aerodrome meets all relevant MOAS requirements and implement maintenance programmes to ensure that they are clearly visible, adequate and unambiguous taking into account of different traffic intensities and visibility conditions.
- 9.2 As part of the operating Safety Management System (SMS) put in place by the aerodrome operator, the aerodrome operator should ensure that information about temporary work areas is adequately disseminated and that temporary markings and signs are clearly visible, adequate and unambiguous in all relevant conditions. A process should be put in place to ensure that airside vehicles from the work area do not inadvertently wander onto the runway.
- 9.3 The aerodrome operator should also conduct regular internal audits on its contractors working within the maneuvering area to ensure a continued focus on runway safety in aerodrome works.

10 Use of Technology

- 10.1 An automated runway incursion warning system or other technology should be implemented by the aerodrome operator to provide advance warning to the control tower that a runway incursion may be taking place.
- 10.2 Advanced surface movement coupled with advance multilateration system and microwave detection systems are some of the technologies used by major airports all over the world. If possible, the aerodrome operator should adopt the use of technology to provide proactive detection of aircraft or airside vehicles from entering an active runway or other unauthorized area.

11 Training of Airside Drivers and Other Personnel

- 11.1 The aerodrome operator should put in place a formal training and assessment programme for all airside drivers operating at the airside to familiarise themselves with the aerodrome layout. Where possible, visits to the maneuvering area by the airside drivers and other personnel should take place for familiarization of markings, lights, signs.
- 11.2 The aerodrome operator should establish traffic/ airside rules with regard to driving in the airside and provide provisions for enforcement actions against airside drivers or any other person, when necessary.
- 11.3 The airside drivers should be licensed and be required to undergo periodic refresher training to maintain the currency of their licences. The aerodrome operator should also implement a process to ensure that airside drivers without the necessary training but are required at the airside, do not enter an active runway or other unauthorised area.
- 11.4 The aerodrome operator should also put in place a formal communications training and assessment programme for airside drivers who need to access the runway or other movement areas. Standard ICAO phraseologies should be used in all communications associated with runway operations.
- 11.5 The training provided should also ensure that the airside drivers immediately contact ATC when uncertain of their exact position on an aerodrome; if an airside driver realises he is on a runway that airside driver should immediately vacate the runway.
- 11.6 It is important to point out that if there is any doubt in the mind of an airside driver when receiving a clearance or instruction, clarification should be immediately requested from ATC.

12 Runway Incursion Prevention Awareness Campaign

- 12.1 The aerodrome operator should also initiate runway incursion prevention awareness campaigns at their aerodromes. Airside drivers and other personnel involved in runway operations should be the audience for these campaigns.
- 12.2 The awareness campaign should be periodically updated to maintain its effectiveness and interest of the audience. The scope of such campaigns should also be adjusted accordingly depending on the operational needs.

13 Other Recommendations

- 13.1 Some other recommendations which the aerodrome operators should adopt to ensure safe operations of aircraft within the aerodrome especially in the aspect of runway incursion are as follows:
 - (a) Full aircraft or vehicle call signs should be used for all communications associated with runway operations;
 - (b) Standard ICAO phraseologies should be used in all communications associated with runway operations;
 - (c) Periodically it should be verified that airside drivers are using standard ICAO phraseologies in all communications associated with runway operations;
 - (d) Readback procedures should include communications with vehicles operating on the manoeuvring area;
 - (e) All communications associated with runway operations should be conducted in accordance with ICAO language requirements for air-ground radiotelephony communications. The use of standard aviation English at international aerodromes will improve the situational awareness of everyone listening on the frequency;
 - (f) All communications associated with the operation of each runway (vehicles, aircraft on tow, etc.) should be conducted on the same frequency as utilised for the take-off and landing of aircraft; and
 - (g) Short and simple messages should be used in ATC communications involving airside drivers.

14 Conclusion

- 14.1 A successful runway incursion prevention programme requires the collaboration of parties including but not limited to, aerodrome operator, air navigation services providers and aircraft operators as it relates to the aerodrome management, airside vehicular movements on the manoeuvring area, air traffic management and the safe operations of aircraft.

- 14.2 In this regard, the aerodrome should also engage various stakeholders and relevant parties to ensure that the runway incursion prevention programme is a successful one.
- 14.3 Periodic review of the runway incursion prevention programme by the aerodrome operators should also be conducted to ensure that the programme is in line with the aerodrome operators' own safety policy and performance targets, in compliance with the requirements found in the MOAS and in tuned to the latest technology, where possible.

15 Reference

Singapore Air Navigation Order (ANO);
Manual of Aerodrome Standards (MOAS);
ICAO Annex 14, Volume I;
Doc 9870 – Manual on the Prevention of Runway Incursions;
Doc 9859 – ICAO Safety Management Manual; and
European Action Plan for the Prevention of Runway Incursions
ALPA White Paper – Runway Incursions
Transport Canada – Runway Incursions

16 Queries

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