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Agenda Item 6: ATM Coordination (Meetings, Route Development, Contingency Planning)

**IMPLEMENTATION OF ENHANCED WAKE TURBULENCE SEPARATION
AT HONG KONG INTERNATIONAL AIRPORT**

(Presented by HONG KONG, CHINA)

SUMMARY

This paper presents information on the project initiated in 2018 by Hong Kong, China for the implementation of a Revised Wake Turbulence Separation Scheme to improve the runway delivery rate at Hong Kong International Airport. During project development, ICAO published information on a new scheme of enhanced Wake Turbulence Separation minima. Considering the similarity of both schemes and for standardisation purposes, Hong Kong, China implemented the ICAO new Scheme on 5 November 2020. The meeting is encouraged to make the best use of this paper to arrange appropriate sessions for sharing experiences and lessons learnt in anticipation of increasing traffic levels.

1. INTRODUCTION

1.1 To enhance the operating efficiency and capacity of Hong Kong International Airport (HKIA), plans had been put in place for major development projects to increase airport capacity, including construction of a third runway, a new passenger terminal and associated infrastructure. As these are long-term airport development strategies, the Civil Aviation Department (CAD) and Airport Authority (AAHK) of Hong Kong, China strived to optimise current runway throughput by adopting new operational procedures. The European Wake Turbulence Categorisation and Separation Minima (RECAT-EU) procedure was recommended, whereby the separation between specific pairs of aircraft on final approach can be reduced, thereby improving productivity whilst maintaining the same level of safety.

2. DISCUSSION

Development of HKIA Project

2.1 The RECAT-EU Safety Case developed by Eurocontrol can provide an ANSP with a framework for a Safety Plan to implement RECAT-EU, but a Local Safety Case is required to demonstrate that the wake encounter risk at the specific location remains acceptable.

2.2 The HKIA RECAT-EU Deployment Study commenced in 2018, beginning with a comprehensive Project Safety Plan based on the Eurocontrol RECAT-EU template, with consultants supported by a joint Project Team from CAD and AAHK, as well as aviation meteorological experts of the Hong Kong Observatory (HKO).

2.3 Based on the operational experience of RECAT-EU at airports in Europe and FAA RECAT 1.5 at airports in the US, in early 2020 ICAO published Amendment 9 to Doc 4444 PANS-ATM, (effective 5 November 2020), which included the promulgation of alternative wake turbulence groups of aircraft and details of enhanced Wake Turbulence Separation (eWTS) minima. With due consideration on the outcomes and SMS process between the application of RECAT-EU and ICAO eWTS, Hong Kong, China implemented ICAO eWTS for arrivals on 5 November 2020.

Collection and Analysis of Data

2.4 In 2018, with the cooperation of AAHK, CAD, HKO and airline operators, the consultants commenced a 12-month study of ATM surveillance records, pilot reports, aircraft flight recorder data and comprehensive LIDAR information on vortex generation and dissipation on final approach. The information was analysed to produce detailed vortex generation and dissipation rates for different groups of aircraft, from which a comparison of calculated risk values could be determined. The examination of events where pilot reports of wake turbulence encounters could be accurately tracked with LIDAR information, flight recorder data and ATM surveillance records proved to be particularly valuable in determining severity of the wake vortices and provided a direct comparison with the RECAT-EU Safety Case material.

Project Safety Plan and Local Safety Case Report

2.5 The Goal Structuring Notation (GSN) methodology was used in the Project Safety Plan to identify dependencies that needed to be addressed for the major safety activities involved in the implementation of the revised wake turbulence separation scheme at HKIA. In addition, a series of Hazard Identification Workshops were held among all stakeholders to address potential operational hazards and risks associated with its implementation.

2.6 In December 2019, the Local Safety Case concluded that the predicted impact to wake turbulence encounter reporting and severity is in line with the expectations of the RECAT-EU Safety Case and the detailed analysis of local Hong Kong wake data supports the reduction in wake turbulence separation.

Implementation Plan and Mitigating Measures

2.7 CAD conducted a Safety Assessment on the Implementation of ICAO eWTS in June 2020 where potential hazards and associated risks were satisfactorily addressed.

2.8 Surveillance simulator training for Approach and Final Director controllers, together with briefing sessions for Aerodrome controllers were conducted between August and October 2020. To assist controllers in applying the prescribed separation minima, new decision support tools were provided to indicate the new wake turbulence group of aircraft in the flight data blocks on the surveillance displays in the ATCC and ATC Tower. A quick reference list showing the enhanced wake turbulence separation minima is also available to the controller.

2.9 Stakeholder Workshops were held in September 2020, with over 100 aircraft operators, pilots and airline operations staff participating. Relevant information was also shared with airlines and pilot organisations operating at HKIA.

Operational Experience and Benefits

2.10 Despite there being significantly reduced global air traffic level due to the COVID-19 pandemic, Hong Kong, China has taken every opportunity to apply the revised wake turbulence separation minima on final approach. Since the implementation of eWTS, controllers were able to practice consistent spacing and accurately achieve the required minima at the runway threshold. There have been no increase in pilot reports of wake turbulence encounters and no increase in the number of missed approaches as a result of eWTS implementation.

2.11 The implementation of eWTS permits a consistent and efficient delivery of arrivals to optimise runway capacity, whilst maintaining safety standards. It can reduce holding delays for inbound flights and provides improved runway delivery rates with existing airport infrastructure. Aircraft operators can benefit from reduced flight time and improved schedule reliability which in turn builds resilience to accommodate schedule plans in post-pandemic recovery.

Stakeholders Collaboration

2.12 As indicated in the AIC and AIP Supplement information, and also emphasised in the Stakeholder Workshops, the benefits of eWTS can easily be negated if flight crews do not actively participate in the application of eWTS practices, e.g. compliance with ATC speed restrictions on final approach and the adherence to minimum runway occupancy times for arrivals (ROTA) by vacating the runway at the first available rapid exit taxiway.

2.13 Implementation of eWTS by Hong Kong, China is considered successful in achieving a good balance among maintaining safety level and enhancing runway delivery rate with low investment cost while making use of the decision support tools in building up confidence and proficiency in controllers. States/Administrations are encouraged to make the best use of this paper to arrange appropriate sessions for sharing experiences and lessons learnt during their implementation of eWTS, and for other ANSPs to consider the benefits of the new procedure.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the implementation process and status of eWTS by Hong Kong, China;
- b) encourage States/Administrations to arrange appropriate sessions for experience sharing and lessons learnt with others and for them to kick-start project initiation; and
- c) discuss any relevant matters as appropriate.

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