



ICAO

International Civil Aviation Organization

**Thirty-Second Meeting of the Asia/Pacific Air Navigation
Planning and Implementation Regional Group
(APANPIRG/32)**

Video Teleconference, 1 – 3 December 2021

Schedule: 10:00 – 13:15 Bangkok Time [UTC+7]

**Agenda Item 3: Performance Framework for Regional Air Navigation Planning and
Implementation**

3.2: ATM

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

(Presented by Hong Kong, China)

SUMMARY

This paper presents a project initiated by Hong Kong, China for the implementation of a Revised Wake Turbulence Separation Scheme to further improve runway delivery rate at Hong Kong International Airport. The project was implemented in compliance with the ICAO new scheme of enhanced Wake Turbulence Separation (eWTS) minima in getting well prepared for air traffic recovery. The initiative for improving productivity was supported by a strong business case, whilst maintaining the same level of safety. In the light of bringing tangible benefits to all stakeholders, States/Administrations are encouraged to share their experience and lessons learnt and may wish to formulate their early plan in implementation.

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 further 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. An early study on the European Wake Turbulence Categorisation and Separation Minima (RECAT-EU) procedure was launched in 2018, whereby the separation between specific pairs of aircraft on final approach can be reduced, thereby improving productivity whilst maintaining the same level of safety.

1.2 The implementing 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.

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 turbulence 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 U.S., ICAO published Amendment 9 to Doc 4444 PANS-ATM, (effective 5 November 2020) promulgating alternative wake turbulence groups of aircraft and details of eWTS minima. With due consideration on various key factors, including the outcomes and SMS process between the application of RECAT-EU and ICAO eWTS, Hong Kong, China implemented ICAO eWTS for arrivals in 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 with all stakeholders on the Implementation of ICAO eWTS in June 2020 where potential hazards and associated risks were satisfactorily addressed.

2.8 All the risk mitigating measures have been properly and timely put in place. 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 made readily available to the controllers.

2.9 Moreover, 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 continuously practice consistent spacing and accurately achieve the required minima at the runway threshold. Under the SMS regime, regular reviews were conducted and relevant key performance indicators were collected, monitored, and analyzed. 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.

Stakeholders Collaboration

2.11 As indicated in the AIC and AIP Supplement issued by Hong Kong, China, and also emphasized 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.

2.12 Implementation of eWTS by Hong Kong, China is considered successful in bringing tangible benefits to all stakeholders despite the significant adverse impact induced by the COVID pandemic. The scheme is able to achieve a good balance among maintaining safety level and enhancing runway delivery rate with low investment cost while making use of the relevant decision support tools in building up confidence and proficiency in controllers. The ICAO APAC Regional Office has timely arranged a RECAT webinar on 22 September 2021, with very encouraging participations, inviting ICAO members to share their experience in eWTS implementation. In the light of the benefits to all stakeholders, States/Administrations are encouraged to share their experience and lessons learnt and may wish to formulate their early plan in implementation of eWTS with the support from the ICAO to convene similar webinars at appropriate time in future.

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 share experience and lessons learnt with others during implementation of eWTS;
- c) encourage States/Administrations to consider formulating their early plan in implementation of eWTS;
- d) seek assistance from ICAO APAC Regional Office to arrange more sharing opportunities; and
- e) discuss any relevant matters as appropriate.