International Civil Aviation Organization

Tenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/10) of APANPIRG

Video Teleconference, 17 – 21 October 2022

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

APPLICATION OF RE-CATEGORISATION OF WAKE TURBULENCE SEPARATION MINIMA IN CHINA

(Presented by China)

SUMMARY

This paper presents the practical operation of re-categorized wake turbulence separation minima in China.

1. INTRODUCTION

1.1 Continued growth in air traffic and increasing runway congestion during peak hours is driving the need for operational improvements to increase runway throughput whilst maintaining the same level of safety. Re-categorisation of wake turbulence to reduce separation minima has demonstrated to be one of the effective operational methods. ICAO has taken Wake Turbulence Separation (WAKE) as one of the threads in the ASBU that will bring about increased airport capacity and reduced overall delays.

1.2 European Wake Turbulence Classification Minima on Approach and Departure were officially promulgated and implemented in July 2015. In 2016, Charles de Gaulle Airport in France was the first airport in Europe to use RECAT-EU. The FAA first implemented RECAT-1 at Memphis Airport in November 2012, followed by airports in Atlanta, San Francisco, and Chicago. The Civil Aviation Administration of China (CAAC) had carried out ATC practical operation of RECAT at Guangzhou/Baiyun International Airport and Shenzhen/ Bao'an International Airport since Dec 5, 2019.

1.3 RECAT can bring immediate benefits to aviation stakeholders while the system safety guaranteed, in terms of runway capacity, operational efficiency and ATC flexibility. RECAT can also provide a rapid recovery from adverse conditions, helping to reduce overall delay and enabling improvements in air traffic flow management (ATFM) slot compliance.

2. DISCUSSION

2.1 ICAO ASBU proposed to reduce the wake turbulence separation to meet the needs of the rapid development of current air transport. The FAA and Eurocontrol have established their own standards based on their own needs, taking into account the pairwise of all types of aircraft. Considering the air traffic flow characteristics of China's typical busy airports, aircraft are classified into five categories based on maximum take-off weight and wingspan. This kind of classification achieved the same benefits as FAA and Eurocontrol, and reduce the cost of implementation and operation.

a) **Super Aircraft:** Aircraft capable of MTOW of 136000kg or more and a wingspan of 75m or more. This category is identified as J;

b) **Heavy Aircraft:** Aircraft capable of MTOW of 136000kg or more and a wingspan greater than 54m and less than 75m. This category is identified as B;

c) **Lower Heavy Aircraft:** Aircraft capable of MTOW of 136000kg or more and a wingspan less than 54m. This category is identified as C;

d) **Medium Aircraft:** Aircraft capable of MTOW greater than 7000kg but less than 136000kg. This category is identified as M. B757 (including B757-200, B757-300, etc.) is classified into this category;

e) **Light Aircraft:** Aircraft capable of MTOW of 7000kg or less. This category is identified as L.

2.2 The Wake turbulence minima depend on the categories of aircraft. RECAT-CN Wake Turbulence Radar Separation Minima (km) are as follows:

		Follow				
		J	B	C	M	L
Leader	J		9.3	11.1	13.0	14.8
	B		5.6	7.4	9.3	13.0
	C				6.5	11.1
	M					9.3
	L					

Practical operation of RECAT-CN

2.3 Since 2017, CAAC has started the research on "Dynamic Wake Turbulence Separation Technology", established the wake turbulence safety assessment model, and calculated the severity of wake turbulence between aircraft pairwise. At the same time, the traffic flow data of Guangzhou, Shenzhen and other major airports and the characteristics of aircraft categories were statistically analysed. Considering the distribution characteristics of aircraft fleet in China, the Chinese version of RECAT standard (RECAT-CN) was initially formulated.

2.4 In 2019, CAAC determined the RECAT separation standard and practical operation scheme, and implemented the "human-in-loop" experimental verification, which confirmed that the RECAT-CN separation standard could achieve efficiency improvement without compromising the safety level. This conclusion is basically consistent with the previous computer simulation results.

2.5 In order to ensure the safe and smooth practical operation of RECAT-CN, CAAC has carried out the following three aspects of work:

a) to ensure that airlines understand RECAT-CN operation operational standards;

b) to guarantee that the ATM automation system can meet the functional requirements of RECAT-CN practical operation;

c) to formulate appropriate working procedures and agreements.

2.6 From 00:00 (UTC) on December 5, 2019, Guangzhou/Baiyun Airport and Shenzhen/Baoan Airport started the one-year practical operations in China. Participating airlines include China Southern Airlines, Hainan Airlines, Shenzhen Airlines, FedEx and UPS.

2.7 On December 31, 2020, CAAC began to promote and implement the practical operation of RECAT-CN at other 12 airports with over tens of millions of throughput, including Beijing/Capital, Shanghai/Hongqiao, Xi'an/Xianyang, Zhengzhou/Xinzheng etc.

Benefits

2.8 The practical application of RECAT-CN in Guangzhou and Shenzhen airport demonstrated that the aircraft pairwise separation minima on final have been averagely reduced by 21%, and the runway throughput has been increased at least by 5% in peak hours and 2% on average.

2.9 The cost of RECAT-CN application is low, only limited to local flight data processing system changes associated with the new wake turbulence categories, and controller training. There is no change to the ICAO flight plan format used by aircraft operators.

2.10 The gain in capacity by RECAT-CN is expected to further increase as the fleet mix is forecasted to evolve with the rapid growth of China's overall traffic volume during the Post-Covid 19 era.

Conclusion

2.11 According to the requirements of ICAO's "Aviation System Block Upgrade", CAAC has actively promoted the application of re-categorization of wake turbulence separation minima, and has achieved satisfactory results.

2.12 In the PANS-ATM (DOC4444), aircraft are classified into 7 categories based on maximum take-off weight and wingspan, China fully considered its operational needs and development level, and simplified the 7 categories of aircraft classification to 5 categories in reference to PANS-ATM.

3. ACTION BY THE MEETING

3.1 The meeting is advised to:

a) take note of the RECAT-CN and its application in China.

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