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)

OPERATIONAL IMPROVEMENTS TO ENHANCE RUNWAY CAPACITY AND IMPLEMENTATION OF WAKE TURBULENCE GROUPS

(Presented by the Republic of Korea)

SUMMARY

This paper presents the Republic of Korea's measures for improvement of airport operation and ATC operation such as the High Intensity Runway Operation procedures and Independent Simultaneous Visual Approach to enhance capacity of Incheon International Airport, and also shares the Republic of Korea's experience of introducing wake turbulence groups to Incheon and Gimpo International Airports in accordance with PANS-ATM standards which became effective in November 2020.

1. INTRODUCTION

1.1 When an imbalance between air traffic demand and capacity occurs, consideration is first given to optimizing the capacity. Diverse approaches may be taken to increase runway capacity: measures involving infrastructure expansion that require long periods of time and budget, such as construction of a new runway and modification of airport layout or configuration; and measures involving operational improvements that can bring results in a relatively short period of time, such as enhancing airport operation, introduction of an improved ATC operation methods, and reducing separation minima.

1.2 Before the outbreak of the COVID-19 pandemic, Incheon International Airport had already improved its runway operation procedure to enhance the runway capacity. Despite the drop in air traffic because of pandemic, Incheon International Airport (RKSI) and Gimpo International Airport (RKSS) have been putting forth diverse measures to secure enough capacity in preparation for the recovery of air traffic, respectively as the Republic of Korea (ROK)'s international and domestic hub airport. This paper presents the introduction and current status of the High Intensity Runway Operation procedures in operation at RKSI, and the trial operation of the new wake turbulence separation minima based on the wake turbulence groups under PANS-ATM at RKSI and RKSS.

2. DISCUSSION

The High Intensity Runway Operation (HIRO) procedures at RKSI

2.1 HIRO is implemented at a number of airports experiencing challenges in expanding their capacity. In particular, RKSI has a relatively longer distance from the runway threshold to a rapid exit taxiway compared with other airports of similar size, which means that there is a physical limitation to reducing the runway occupancy time. In order to overcome this physical limitation, the ROK: a) created the HIRO procedures tailored to RKSI by consulting with airlines, pilots, and air traffic controllers and started implementation of the procedures (September 2017~), and b) built multiple rapid exit taxiways on the 4th runway which was completed in 2021. In addition, the operator of RKSI is planning to construct more rapid exit taxiways for the other runways during re-surfacing period.

2.2 The HIRO procedures at RKSI consist of landing and departure procedures. Details of the procedures are described in AIP RKSI AD 2.20.

2.3 Under HIRO, aircraft operators must comply with a stricter operation procedure when using the runway for landing. Aircraft landing at RKSI are encouraged to use designated rapid exit taxiways (RET) and vacate the landing runway within 60 seconds, in order to minimize go-arounds incurred by long runway occupancy time and to maximize arrival rate. Also, the information on the distance each RET from threshold as well as RET configuration (e.g. RET design speed: 50 kt) is provided to avoid aircraft from decelerating to taxi speed on midpoint of landing runway and to vacate runway at optimum speed.

2.4 As for departures, commonly-used intersection departure points are published so that pilots may anticipate the intersection departure point from the flight planning phase. Departing aircraft are encouraged to move within 10 seconds from the issuance of line-up and wait instruction or take-off clearance in order to reduce unnecessary runway occupancy time.

2.5 About two years after the implementation of the HIRO, the throughput of the main landing runway was analyzed. In October 2019, the average runway occupancy time decreased by 13.3%, from 74.3 sec. to 63.4 sec. compared to April 2017. In addition, the percentage of aircraft with 70 sec. or longer runway occupancy time was 73.7%, but the figure dropped significantly in October 2019 to 19.2%. This shows that the introduction of HIRO has reduced chances of go-arounds of the following aircraft due to runway occupancy of the preceding aircraft and improved the runway capacity.

Other ATC operational measures

2.6 RKSI has made continued efforts to improve its runway capacity through introduction of ATC operational measures that can bring about immediate effects without requiring system upgrades or input of additional human resources or funds. Such measures include implementation of the Reduced Runway Separation Minima in accordance with PANS-ATM 7.11 in 2017 and introduction of the Independent Visual Approach in parallel runway in 2020.

Wake Turbulence Separation Minima

2.7 The existing ICAO wake turbulence separation categories were determined more than 40 years ago based on the performance of aircraft, surveillance system, etc. of the time. However, with advances in aircraft and surveillance system functions, these rules are now considered excessive and outdated. After examining many research outcomes and on-site operation cases, ICAO introduced new wake turbulence separation minima (hereafter “the new separation minima) which is also as a relation to ASBU WAKE-B2/1, based on seven new wake turbulence groups categorized by the maximum take-off weight and wing span of aircraft. The new wake turbulence separation minima were implemented on November 5, 2020.

2.8 ICAO allowed States/Administrations to choose between the new separation minima and the legacy separation minima. The ROK analyzed the composition of wake turbulence groups of landing aircraft in each of its airports, performance of surveillance system, and projected effects of implementing the new separation minima, and selected RKSI and RKSS – the airports with single-mode runways for landing/departure – to conduct a trial operation of the new separation minima. Between the time-based separation and distance-based separation set forth in PANS-ATM 5.8 and 8.7 respectively, the ROK selected the distance-based approach separation for the trial at RKSI and RKSS for one year as it is expected to be more effective.

2.9 Prior to the trial operation, a safety risk management process was conducted by Seoul Regional Office of Aviation (SROA) in charge of RKSI and RKSS with participation from air traffic service providers, airlines, and airport operators. SROA identified hazards such as mismatch of aircraft type between flight plan and actual flight, and air traffic controller's human error in implementing new separation minima and conducted safety risk assessment for that hazards. Mitigation measures against safety risks include requiring pilots through AIP to inform ATC of their aircraft type at initial contact, handing out wake turbulence group reminder cards to all air traffic controllers, and placing the wake turbulence group reminder card on each controller working position.

2.10 ASBU does not imply the use of new equipment for application of the seven new wake turbulence groups, but nonetheless, the ROK plans to further reduce the abovementioned air traffic controller's human error by upgrading its surveillance systems to enable display of separation indicators between aircraft and improve safety alert functions.

2.11 RKSI and RKSS notified the trial operation via AIP SUP issued in December 2021, and included the details on pilot procedures and wake turbulence encounter report. The new separation minima could be tested out in the early half of 2022 with the overall rise in air traffic and concentration of traffic during peak hours, and as of now, there has not been any report of wake turbulence encounters from a pilot or an airline.

2.12 Considering the smooth trial implementation of the new separation minima, SROA will decide official transition to the new scheme after review of trial operation. The ROK will advance the operation procedures going forward through continued monitoring of wake turbulence encounter report and performance analysis.

Conclusion

2.13 For the last two years, States/Administrations struggled to recover the air traffic demand which was greatly affected by the pandemic. As the result of such efforts, air traffic has been slowly recovering without major safety issues in not just Asia-Pacific but all around the world. Each State/Administration should now think about how to increase its capacity to handle an increased traffic demand in the near future. It is encouraged to use this paper as an opportunity to discuss and share each State/Administration's experiences and lessons learnt, including those of the ROK, with regard to this issue.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

…….