



Capacity and Efficiency

RECAT Implementation in ROK

27 June 2023

ICAO APAC RSO / RECAT Webinar



CONTENTS

I History

II Trial Operation

III Analysis of Trial Operation

IV Benefit / Feedback

V Future Plan

Steps taken by ROK to implement RECAT

01 RECAT Action plan – Feb. 2021

- Recognizing the necessity of RECAT
- How to Roll-out?

02 SMEs Meetings – Mar. 2021

- Including ATCO, pilot, airport operator, institutes
- Criteria for Selection of Aerodrome
- What need to be prepared

03 Regulatory Framework– Aug. 2021

- Based on PANS-ATM Amdt 9 to 15th edition
- Include definition, Separation minima,



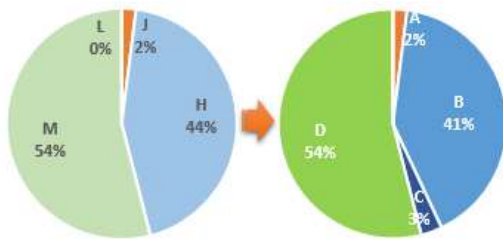
Provisions
Same Runway Separation
Wake Turbulence Separation For Intersection Departures
Arrival Minima
Wake Turbulence Cautionary Advisories
Approaches To Multiple Runways
Sequencing
:



Trial Operation

Trial Operation Plan – RKSI/ RKSS

Aerodrome Selection



- Traffic Volume
- Feet Mix
- Aerodrome Design
- Runway Operation
- Peak Time Congestion
- Data Availability
- Development Possibility

Safety Risk Assessment

구분	심각도				
	A Catastrophic 매우 심각	B Hazardous 위험	C Major 중대	D Minor 경미	E Negligible 매우 경미 영향 없음
5 빈번한 경우 Frequent	5A	5B	5C	5D	5E
4 간헐적인 경우 Occasional	4A	4B	4C	4D	4E
3 드문 경우 Remote	3A	3B	3C	3D	3E
2 매우 드문 경우 Improbable	2A	2B	2C	2D	2E
1 매우 희박한 경우 Extremely improbable	1A	1B	1C	1D	1E

- Analyze Operational Environment
- Identify Hazards
- Severity & Possibility
- External elements
- Include SMEs(ATCO, Pilot)

Mitigation Measure



- Align with Local Procedure
- Twr/App Cord. Procedure
- Need of Supporting Tools
- Alternate Procedure
- Include SMEs(ATCO, Pilot)
- Reassessment



Trial Operation

Trial Operation Plan – RKSI/ RKSS

ATCO Training



- Both control Twr ATCOs
- Approach ATCOs
- Principle and Practice
- Using SIM
- Conduct Survey
- Feedback and Evaluation

Pilot Notification

TEL : 82-83-666-0255
 FAX : 82-83-666-0277
 AFS : RKRRYYXX
 E-mail : aais@korea.kr
 Web : http://aais.casa.go.kr

REPUBLIC OF KOREA AIP
 Ministry of Land, Infrastructure and Transport **Supplement 33/21**
 Office of Civil Aviation
 11, Domsu 6-ro, Sejongsi, 30103, Republic of Korea **18 NOV 2021**

GEN : NIL
 ENR : NIL
 A D : SEOUL/Incheon INTL(RKSI), SEOUL/Gimpo INTL(RKSS)

TRIAL OPERATION OF RE-CATEGORIZATION(RECAT) WAKE TURBULENCE SEPARATION MINIMA WITHIN SEOUL TMA

1. INTRODUCTION
 As ICAO PANS-ATM revised in November 2020, RECAT wake turbulence(WT) separation minima will be used at Seoul TMA(RKSI, RKSS). The RECAT WT separation minima is based on a grouping of aircraft types into seven groups(A to G).

2. PERIOD
 From 1600 UTC 15 DEC 2021 To 1600 UTC 14 DEC 2022

3. APPLICATION
 (1) Applicable airport : Incheon INTL Airport(RKSI), Gimpo INTL Airport(RKSS)
 (2) Applicable area : Seoul TMA, Incheon control zone and Gimpo control zone
 (3) RECAT WT separation minima is applied for arrival and departure phases, when the aircraft is in the air.
 (4) For takeoff phase, time based RECAT WT separation minima described in ICAO PANS-ATM is not applicable.
 (5) RECAT WT group designators are described as follows:

RECAT Group	MTOW	Wing Span	Example
GROUP A		74.68 m < A ≤ 80.0 m	A380
GROUP B	136 000 kg or more	53.34 m < B ≤ 74.68 m	A330, B748, B773
GROUP C		38.1 m < C ≤ 53.34 m	B767, MD11
GROUP D		32.0 m < D ≤ 38.1 m	A320, B737
GROUP E	less than 136 000 kg, but more than 18 600 kg	27.43 m < E ≤ 32.0 m	E190, GLEX
GROUP F		F ≤ 27.43 m	GLF4, CRJ7
GROUP G	18 600 kg or less	No wing span criterion	C325, C172

- AIRAC AIP
- Pilot Procedure
- Only Arrival/Departure
- RECAT of T/O is N/A
- Comply Speed Restriction
- Initial Contact information

Supporting Tool

RECAT		후행 FOLLOWER						
		J	H	C	D	M	F	L
선행 LEADER	J	A	4	5	5	6	6	8
	H	B	3	4	4	5	5	7
	M	C				3.5	3.5	6
	L	D						4
	J	E						4
	H	F						
	M	G						

		J	H	C	D	M	F	L
A388	A124	A300	A318	B733	AT42	ASTR		
A330	A310	A319	B736	AT75	AT8T			
A340	B767	A320	B735	CL60	B190			
A350	C17	A321	DHC7	CRJ2	B350			
B747	MD11	A20N	E190	E35L	BE20			
B777	IL62	A21N	F100	F900	BE9L			
B787	IL76	B736	F70	FA7X	C172			
IL96	TU22	B737	GLEX	GLF2	C208			
AN22	TU95	B738	GLF4	GLF3	C25C			
	C135	B739	GL5T	GLF4	C550			
		B757	GL7T	SF34	C560			
		BC53			LA25			
		C130			LJ45			
		T204			LJ60			
					PA46			
					SF50			

- Memory Card
- Based on main Fleet Mix
- Consider ATC Automated Supporting Tools



Trial Operation Analysis



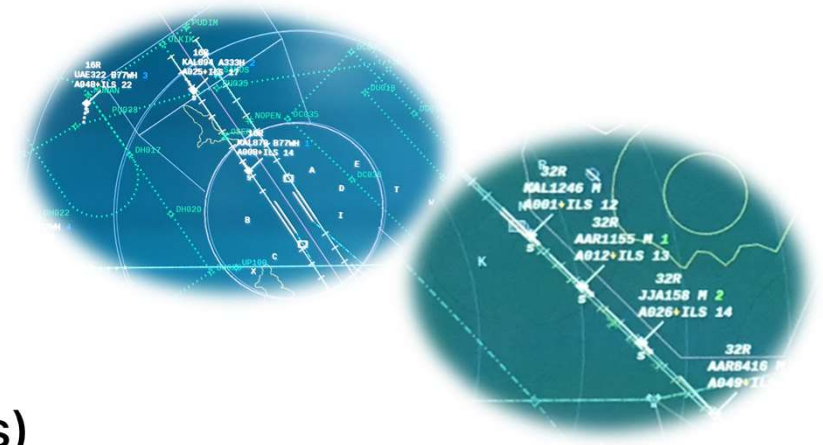
Total Period

- 15 Dec. 2021 ~ 14 Dec. 2022 (1 Year)

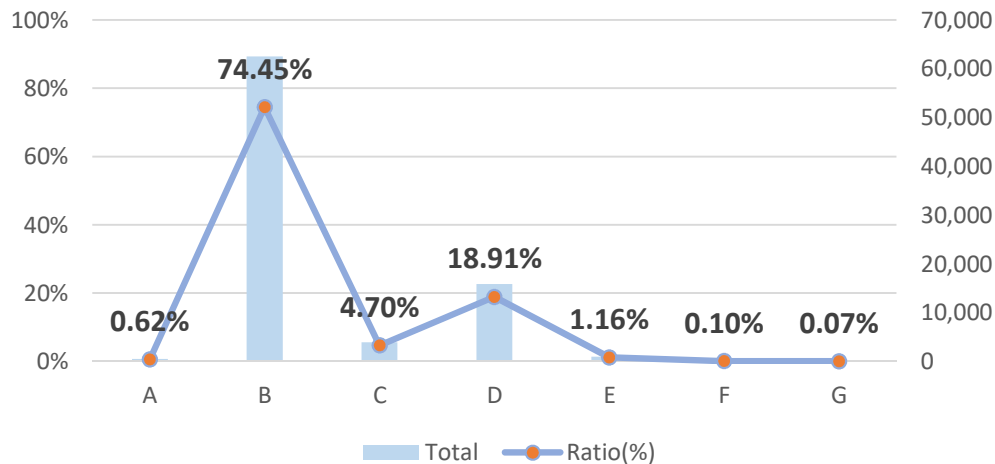
Analysis Period

- One week from Jan, Feb, Jun, Jul (Total 4 weeks)

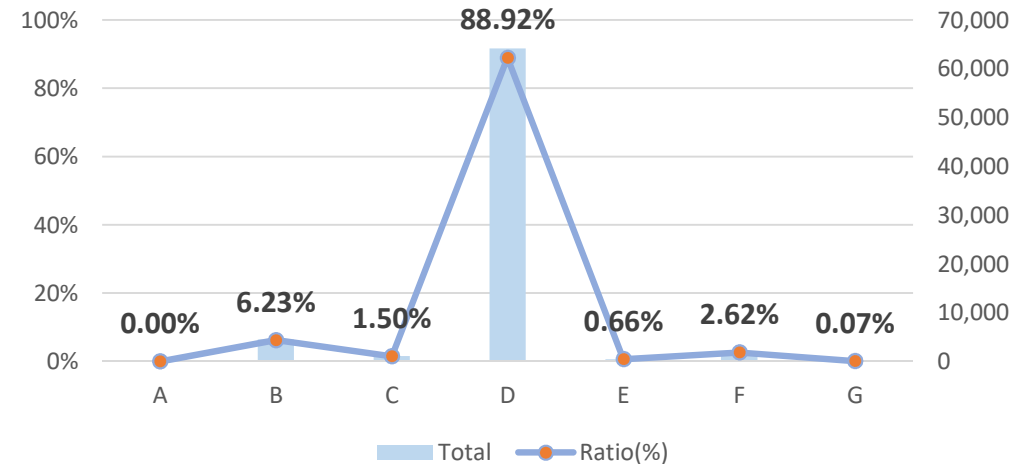
- Insufficient cases due to reduced traffic volume



RKSI Arrival Fleet (RECAT)
(2021-12-16 ~ 2022-11-18)



RKSS Arrival Fleet (RECAT)
(2021-12-16 ~ 2022-11-18)





Trial Operation Analysis

Figures

RKSI

RKSS

RECAT Case

4.5% (67 out of 1,497)

27.8% (57 out of 205)

Average Reduction

0.6NM (max 1.2NM)

0.4NM (max 0.6NM)

Safety Case

pilot report **0**

1 missed approach

▲ Adverse Weather

RKSI

RECAT Pair	Case	Legacy	RECAT	Actual(Avg.)	Reduction(Avg.)
'A-B'	6	6	4	4.82	1.18
'A-D'	2	7	5	5.97	1.03
'B-B'	31	4	3	3.73	0.27
'B-D'	27	5	4	4.54	0.46
'C-D'	1	5	3	4.71	0.29



Trial Operation Analysis



Figures

RKSI

RKSS

RECAT Case

4.5% (67 out of 1,497)

27.8% (57 out of 205)

Average Reduction

0.6NM (max 1.2NM)

0.4NM (max 0.6NM)

Safety Case

pilot report **0**

1 missed approach

▲ Adverse Weather

RKSS

RECAT Pair	Case	Legacy	RECAT	Actual(Avg.)	Reduction(Avg.)
'B-B'	1	4	3	3.79	0.21
'B-D'	36	5	4	4.58	0.42
'C-D'	16	5	3	4.49	0.51
'C-F'	4	5	3.5	4.44	0.56

IV

Benefit and Feedback



- Efficiency, Capacity, Flexibility ↑
- Flight time, Delay, CO2 Emission
 - Further Analysis needed
- One of ROK NANP element
- Without Big Change & Cost

Vision			
Ensure Seamless and Safe Optimal Flight through Data System			
Goals			
	Existing (2019)	- 2024 (Short Term)	- 2042 (Mid/Long term)
◆ Enhancement in Flight Efficiency	Domestic 63 minutes, International 97 minutes	(Domestic) 62.7 minutes, (International) 96.7 minutes (Flight time 0.5% ↓)	(Domestic) 56.7 minutes, (International) 87.3 minutes (Flight time 10% ↓)
◆ Growth in Air Traffic Volume	Total number of flights 0.84 million	0.84 million flights (ATM traffic volume recovered)	1.69 million (ATM traffic volume doubled ↑)
◆ Improvement in User Convenience	Departure 76%, Arrival 76%	Departure 77%, Arrival 77% (Punctuality 1% ↑)	Departure 92%, Arrival 91% (Punctuality 20% ↑)

Feedback



- Some Fleet not on the Memory Card
- Insufficient Cases
- Understanding Fears
- Technical Support

Designator	Manufacturer	WTC	RECAT
FA8X	FALCON 8X	M	F
AN12	Antonov AN-12	M	D
BE40	HWAKER400	M	G
G150	GULFSTREAM G-150	M	G
C25C	CESSNA CITATION CJ4	M	G
C680	CESSNA-680	M	G
E295	ERJ-190-400	M	D
GA6C	GULFSTREAM G-7 G600	M	E

:

01 Operation



1. Extend Trial Period(~Dec 2023)
2. Official Operation
3. More Applicable Aerodrome
4. Experience & Credibility

02 System



1. Automated ATCO Tools, System
2. Review & Modify Safety Net

03 Monitor



1. Traffic Recovery, RECAT Case
2. Continuous Safety Reports
3. Runway Configuration Change

04 Analysis

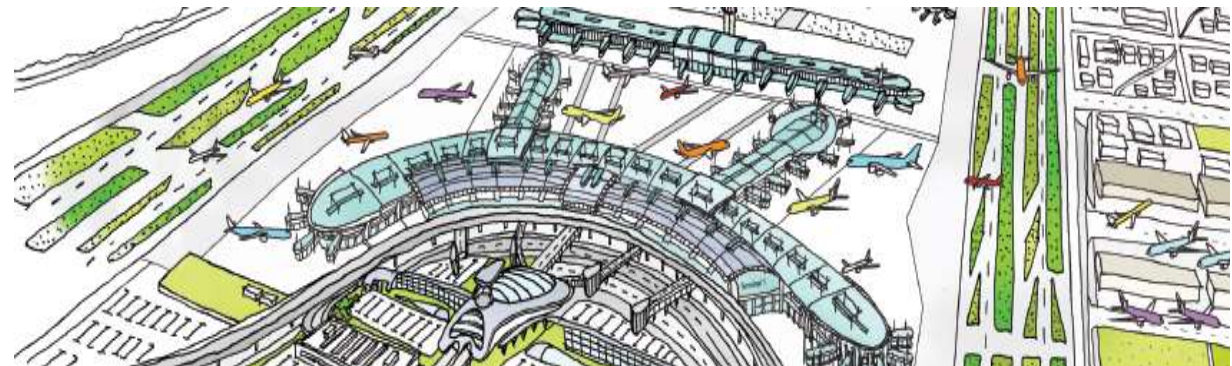


1. Review Safety Case, Events
2. Benefit & Feedback
3. Identify Improvement Area

05 TBS



1. New PANS-ATM(8.7.3.7)
2. Upgrade ATS Surveillance System
3. Further Study & Aerodrome Analysis





Thank You