Ministry of Land, Infrastructure, Transport and Tourism
JAPAN CIVIL AVIATION BUREAU

eWTS Implementation in Japan

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Topics

- Background/History of RECAT/eWTS in Japan
- Developing eWTS to Other Airports
- Preparation for Implementing eWTS
- Wake Turbulence Encounter Report (WTER)

Why was RECAT/eWTS required in Japan?

- Air traffic demand in Japan was expected to grow by 2 to 3 percent per year before the pandemic of COVID-19.
- More efficient runway and terminal airspace operation were required, particularly at the Tokyo metropolitan airports, Tokyo/Narita international airport (RJAA/NRT) and Tokyo/Haneda international airport (RJTT/HND).
- The introduction of RECAT/eWTS at RJAA/NRT and RJTT/HND by early 2020 was determined in 2018.
- Preparation for the Tokyo 2020 Olympic and Paralympic Games was one of the reasons.

History of RECAT/eWTS Implementation in Japan

Oct 2011 - Mar 2019

- Research Phase
- Development Phase

For 8 years

- Research of other States' progress
- Determination of implementing airports (RJAA & RJTT)
- Development for ATC support system
- Attendance at ICAO panel and group

Apr 2019 - Mar 2020

- Consideration Phase
- Safety Assessment Phase

For 1 year

- Consideration for ATC operation
- Safety assessment
- Updating ATC system
- ATC training
- Information to aircraft operators

26 Mar – 3 Nov 2020

- Trial Phase (RECAT)
- Monitoring Phase

For 7 months

- Operational trial at RJAA & RJTT
- Collection & analysis of WTERs
- Post implementation review & assessment

4 Nov 2020 -

- Operational Phase (eWTS)
- Monitoring Phase
- Research Phase for Advanced RECAT

- Actual Operation at RJAA & RJTT
- Collection & analysis of WTERs
- Research for deployment to other airports
- Research for TBS Implementation

Next Airports Implementing eWTS

- Osaka/Kansai international airport (RJBB/KIX) and Osaka/Itami international airport (RJOO/ITM) are designated to implement eWTS.
- One of the reasons is the Expo 2025 Osaka, Kansai, Japan, which will be held from 13 April to 13 October 2025.
- During the Expo, domestic and international flights at RJBB and RJOO are expected to increase significantly, and demand for visiting Osaka, Kansai will be steady and sustainable after the Expo.
- Implementing eWTS at RJBB and RJOO is one of the mitigation measures to reduce delay and holding time due to boosted flights.

Kansai Airport

Major national events such as the Olympics and Expo would become a rational trigger to implement eWTS!

Preparation for Implementing eWTS

- Safety assessment for implementing eWTS at RJBB and RJOO has been started since June 2023, and the safety assessment will last ten months.
- Operational trial will be commenced in March or April 2024 after completion of the safety assessment.
- The operational trial will be planned for approximately one year, and post-implementation review and assessment will be conducted in the later three months of the operational trial.
- The target date for starting the actual operation of eWTS is the end of March 2025, just before the beginning of the Expo 2025.

Safety Assessment for eWTS

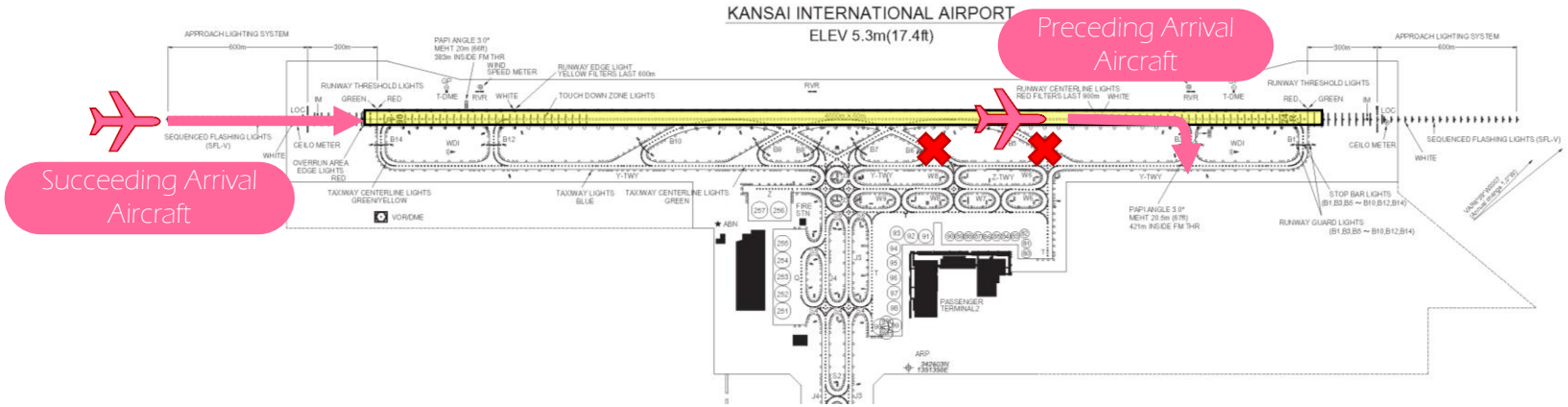
- Purpose
  - Consideration to mitigate increasing ATC workload
  - Identification of expected hazards after implementation
  - Consideration for mitigation measures to reduce risks

Safety Risk		Severity				
Probability		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

- Method
  - ICAO Doc 10122 “Manual on Implementation of Wake Turbulence Separation”
- Stakeholders
  - ANSP (JCAB HQ)
  - Regulator (JCAB HQ)
  - ATC units (Kansai & Osaka TWR & Kansai TERMINAL)
  - Aircraft operators (Japanese Operators)
  - Research institute (ENRI[*1]) *1: Electronic Navigation Research Institute

Estimated Hazard at RJBB

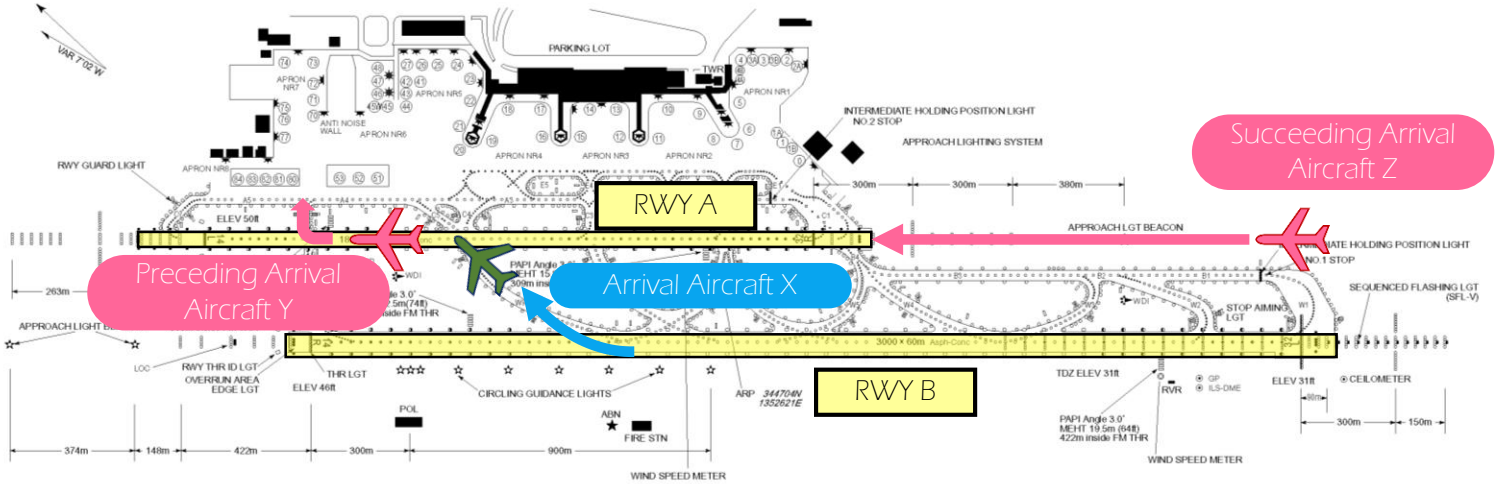
- Estimated Hazard at RJBB (Sample)
  - There are non-high speed exit TWYs at RJBB, and some arrival aircraft are required to leave RWY via non-high speed exit TWYs due to weather conditions, operational restrictions, etc.
  - Arrival aircraft taking non-high speed exit TWYs would need more time until leaving RWY than aircraft turning to high speed exit TWYs.



  - If Air Traffic Control Officers (ATCOs) were unaware that preceding arrival aircraft had to take non-high speed exit TWYs, the separation between preceding and succeeding arrival aircraft might become tighter than expected.

Estimated Hazard at RJOO

- Estimated Hazard at RJOO (Sample)
  - There are close parallel RWYs at RJOO, and arrival aircraft at RWY B must cross RWY A to move to their spot.
  - There are cases where arrival aircraft X at RWY B crosses RWY A between preceding arrival aircraft Y and succeeding arrival aircraft Z at RWY A.



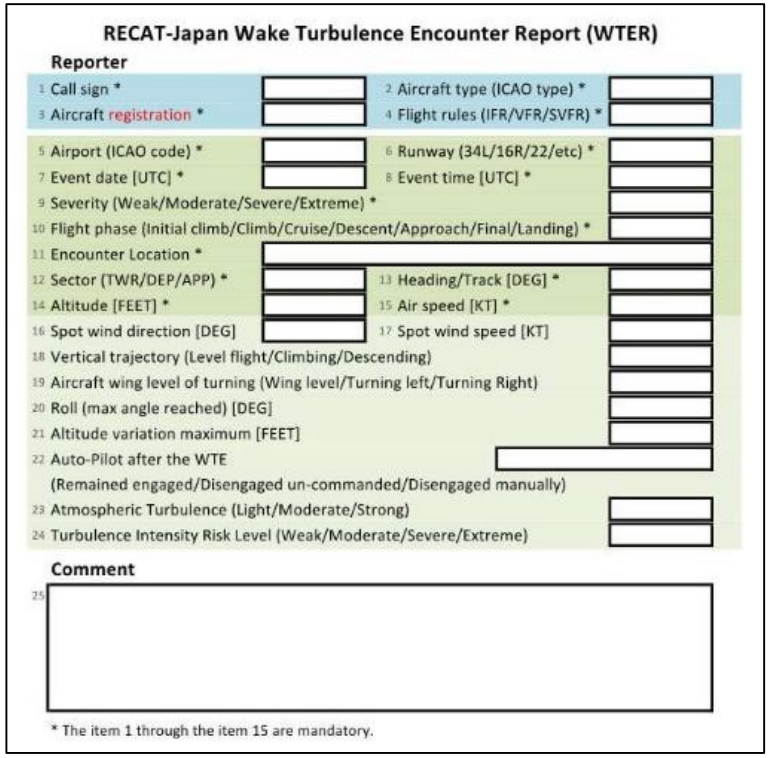
  - If arrival aircraft X crossed RWY B more slowly than ATCOs expected, arrival aircraft Z would be close to the threshold of RWY A at the time aircraft X vacated RWY A.

Wake Turbulence Encounter Report (WTER)

- Purpose
  - Collection and analysis of WTERs are required to monitor safety issues after implementing eWTS.

- Format and Items
  - The WTER format is not standardized by ICAO.
  - The items for WTER have been considered and discussed at the Wake Turbulence Specific Working Group (WTSWG).

- Sharing with ICAO
  - The collected and analyzed WTERs are required to submit to ICAO HQ through the ICAO secure portal website.



RECAT-Japan Wake Turbulence Encounter Report (WTER)

Reporter

1 Call sign *		2 Aircraft type (ICAO type) *	
3 Aircraft registration *		4 Flight rules (IFR/VFR/SVFR) *	
5 Airport (ICAO code) *		6 Runway (34L/16R/22/etc) *	
7 Event date [UTC] *		8 Event time [UTC] *	
9 Severity (Weak/Moderate/Severe/Extreme) *			
10 Flight phase (Initial climb/Climb/Cruise/Descent/Approach/Final/Landing) *			
11 Encounter Location *			
12 Sector (TWR/DEP/APP) *		13 Heading/Track [DEG] *	
14 Altitude [FEET] *		15 Air speed [KT] *	
16 Spot wind direction [DEG]		17 Spot wind speed [KT]	
18 Vertical trajectory (Level flight/Climbing/Descending)			
19 Aircraft wing level of turning (Wing level/Turning left/Turning Right)			
20 Roll (max angle reached) [DEG]			
21 Altitude variation maximum [FEET]			
22 Auto-Pilot after the WTE (Remained engaged/Disengaged un-commanded/Disengaged manually)			
23 Atmospheric Turbulence (Light/Moderate/Strong)			
24 Turbulence Intensity Risk Level (Weak/Moderate/Severe/Extreme)			

Comment

25

* The item 1 through the item 15 are mandatory.

WTER format in Japan

WTER Process

Report & Submission

- Pilots who encountered wake turbulence submit WTER to ATC division of JCAB HQ (ANSP).

Initial Analysis

- ATC division identifies generator aircraft[*2].
- ATC division checks the established separation between reporter aircraft[*3] and generator aircraft to confirm whether the established separation was greater than the eWTS separation minima.

Evaluation

- If the established separation did not meet the eWTS separation minima, the fact is informed to SMS officers (ANSP) and relevant ATC units. (Then, corrective action is conducted.)
- ATC division evaluates the WTER to analyze whether severity and risk of the event are acceptable.

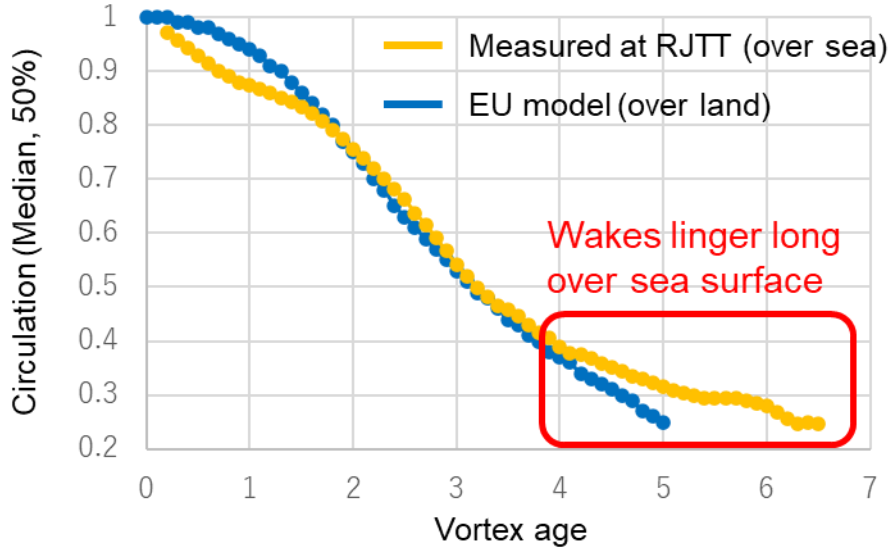
Summary

- ATC division records the evaluated WTER on the original database to manage WTERs.
- ATC division shares the result of evaluation and analysis of WTERs with ICAO HQ.

*2 Generator aircraft: Aircraft that identified to have generated wake turbulence and affected impact to reporter aircraft
*3 Reporter aircraft: Aircraft that encountered wake turbulence and reported WTER

Analysis of WTERs

- RJAA is located land area, and RJTT is located seaside.
- Many flight procedures/routes for approach/departure at RJTT are over the sea.
- Almost all WTERs have been reported by flights at RJTT.
- Wake decay over the sea is slightly slower than over the land.



Non dimensional wake decay curves for heavy aircraft in RWC (reasonable worst condition)

Analysis of WTERs

- Thirty-two WTERs were reported from March 2020 to March 2023.
- Only two WTERs were reported by departure aircraft at RJAA, and the rest of the thirty WTERs occurred at RJTT.
- More WTERs were reported in the summer and autumn seasons.
- Wind strength in the summer is weaker than in other seasons in Japan.

Year	Airport	FLT STS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	RJAA	APP													0
		DEP								1					1
	RJTT	APP							1	2			1	1	5
		DEP				1				1			1		3
2021	RJAA	APP													0
		DEP													0
	RJTT	APP						1					2	1	4
		DEP													0
2022	RJAA	APP													0
		DEP										1			1
	RJTT	APP	1					1	1	1	3	2		1	10
		DEP		1					1	2		1			5
2023	RJAA	APP													0
		DEP													0
	RJTT	APP		1	2										3
		DEP													0
Total			1	2	2	1	0	2	3	7	3	4	4	3	32

Analysis of WTERs

- B738 is the top contributor reporting WTERs.
- A359 records the highest number of generator aircraft in the approach phase, and B763 is the highest number of generator aircraft in the departure phase.
- If B788 and B789 are merged as the B787 series, the B787 series marks the same and highest number of generator aircraft in the approach phase.

	FLT STS	A20N	A321	A320	A359	B738	B748	B763	B772	B77W	B788	B789	Total
Reporter	APP			1		20					1		22
	DEP			1		9							10
Generator	APP	1			5	2	1	4	2	2	3	2	22
	DEP		1					7			1	1	10

- However, the component/combination of reporter and generator aircraft depends on the traffic flow and fleets of each airport.

Detailed evaluation and analysis of WTERs are needed by considering the characteristics of each airport!


Thank you for your attention!