Policy: Improved Monitoring for Parallel Runway Systems (EN-11)

Contribution: Narita Airport capacity increased from 64 to 68 per hour (since March, 2014)

Research Institute: ENRI (Electronic Navigation Research Institute)

<Policy Overview>
With the use of WAM, positions of aircraft flying in the vicinity of the airport can be provided to air traffic controllers with high accuracy and frequency.

<Output Overview>
- Experimental WAM system was developed to test in real-life environment the provision of aircraft positions with high accuracy and frequency assuming simultaneous parallel runway operations.
- With the implementation of WAM, achieved simultaneous parallel runway operations at Narita Airport, contributing to increase in airport capacity [began operation since March, 2014].

<Research Overview> 2009-2012
- Objective: Development of high-capacity WAM and performance study in real-life environment
- Theme: Study for Enhanced Airport Surface Monitoring
- Structure: See below

<Incorporation of ENRI Technology>
- Provided decision making material for WAM-enabled simultaneous parallel runway operations as well as incorporating the experiment results into the capacity specifications.

<Website Link> ENRI Annual Report
https://www.enri.go.jp/info/nenpou/nenpou_index.htm

<Contact>
(Contact for Policy) CARATS Office
MLIT JCAB Air Navigation Services Dep. Air Navigation Services Planning Dep. 03-5253-8111(ex. 51104/51106)
(Contact for Research) National Institute of Maritime, Port and Aviation Technology Electronic Navigation Research Institute, Independent Administrative Institution, Managing Director for Research Affairs, 0422-41-3432
Policy: Dynamic Terminal Airspace Management/Point-Merge (OI-3)

Contribution: Benefit estimation and operation concepts in videos were achieved (from 2020)

Research Institute: ENRI (Electronic Navigation Research Institute)

- Objective: Development of PMS simulation model
- Theme: Study for ATM Performance Assessment
- Structure: See below

Example of PMS approach procedure

Prediction by Simulation
- Simulation model will be developed and evaluated for consistency with real conditions
- Evaluated model will be used to estimate fuel consumption and arrival
- Video will be developed to get an idea of traffic flows

Operational Benefits
- Reduction in fuel consumption by repetitive descent toward the merge point etc.

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ENRI Annual Report
https://www.enri.go.jp/info/nenpou/nenpou_index.htm
Research Institute: ENRI (Electronic Navigation Research Institute)

**Policy Overview**
GBAS: Ground-Based Augmentation System

- Introduction of Precision Approach service (CAT I) by implementing ICAO-standard GBAS [trial operation to begin from FY2019 at Haneda Airport]

**Output Overview**
- Implementation of GBAS (CAT I) at Haneda Airport was enabled by incorporating technology that ensures safe approach and landing (adjusting to disturbance caused under Japan’s ionosphere conditions, which differ from western countries)

**Incorporation of ENRI Technology**
1. New development of safety design technology for precision approach that meets ICAO international standards through design and manufacturing of experimental prototype (experimented in airport environment and on airline aircraft)
2. New monitor procedure adjusting to disturbance caused under ionosphere conditions in areas with a low magnitude latitude such as Japan

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(Contact for Research) National Institute of Maritime, Port and Aviation Technology Electronic Navigation Research Institute, Independent Administrative Institution, Managing Director for Research Affairs, 0422-41-3432
Policy: Implementation of ALWIN (Airport Low-level Wind Information) (EN-4 related)

Contribution: Low-altitude observation information provided for Haneda/Narita airports (from April, 2017)

Research Institute: JAXA (Aerospace Exploration Agency)

**<Policy Overview>**

- Information provision for operators on Airport Low-level Wind Information including wind shear along approach procedures [implemented at JMA since April 2017 for Haneda/Narita airports]

**<Research Overview> 2011-2015**

- **Objective:** Observation, information provision and operational assessment for low-level wind conditions
- **Theme:** Research and Development for Information Contributing to Safe Aircraft Operations based on Low-level Wind Shear Information (collaborative research with JMA and JAXA)
- **Structure:** See below. Subsidized operation for JAXA

**<Incorporation of ENRI Technology>**

1. Technology for automated extraction of wind condition changes affecting take-off and landing based on analysis of flight data from airlines, incorporated into JMA systems processing
2. Format for wind conditions provision readily interpretable to pilots reflecting operational assessment by operators, incorporated into text format

**<Website Link>** http://www.aero.jaxa.jp/research/star/dreams/weatherinfo/

**<Contact>**

(Contact for Policy) CARATS Office
MLIT JCAB Air Navigation Services Dep. Air Navigation Services Planning Dep. 03-5253-8111(ex. 51104/51106)

(Contact for Research) Japan Aerospace Exploration Agency, Independent Administrative Institution, Aeronautical Technology Directorate, PR 050-3362-8036
**Research Institute: ENRI (Electronic Navigation Research Institute)**

### <Research Overview> 2012-2015

- **Objective:** Proposal of conditions on optimized route generation for PACOTS (Pacific Organized Track System)
- **Theme:** Study for optimization of oceanic routes including arriving routes
- **Structure:** See below: subsidized operations

### <Output Overview>
- Oceanic ATC simulation conducted to test implementation benefits of CDP/ITP, confirming reduction tendencies in fuel consumption and flight time
- CDP/ITP will be implemented in Fukuoka FIR [from FY 2019]

### <Incorporation of ENRI Technology>
- Contributed to decision making by providing airlines with simulation results

### <Website Link>
ENRI Annual Report
https://www.enri.go.jp/info/nenpou/nenpou_index.htm
Policy: GNSS Navigation Service Provision across All Flight Phases (EN-7)
Optimized RAIM Prediction, GNSS Performance Surveillance

Contribution: GNSS surveillance realized (from 2020)

Research Institute: ENRI (Electronic Navigation Research Institute)

<Policy Overview>

- Safe PBN (Performance-Based Navigation) operations can be achieved by introducing ICAO standard GNSS (Global Satellite Navigation System) equipment

<Output Overview>


<Research Overview> 2016-2017

- Objective: Proposal of concept for GNSS surveillance
- Theme: Study on GNSS surveillance
- Structure: See below. Subsidized operation

<Incorporation of ENRI Technology>

1. Performance requirements for GNSS surveillance were proposed and incorporated to meet ICAO international standards through experimental systems
2. New procedure was proposed and incorporated for instant detection of GNSS outage by monitoring onboard navigation performance information

<Website Link> ENRI Annual Report
https://www.enri.go.jp/info/nenpou/nenpou_index.htm

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(Contact for Policy) CARATS Office
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(Contact for Research) National Institute of Maritime, Port and Aviation Technology Electronic Navigation Research Institute, Independent Administrative Institution, Managing Director for Research Affairs, 042-41-3432
**Policy: Employment of DAPs (EN-12) DAPs for SSR**

**Contribution: Assessment of DAPs reliability for development of DAPs-ready SSR (from 2018)**

**Research Institute: ENRI (Electronic Navigation Research Institute)**

### <Policy Overview>
- Reliability assessment and information downlink for use in ATC systems can be achieved by introducing SSR Mode S sensors with DAPs capability.

### <Output Overview>
- Development of a monitoring system for detecting abnormal values and evaluating matches with set-up information and DAPs information.
- Assessment towards enhanced reliability for DAPs after implementation [Assessment to begin after 2015]

DAPs and radar-derived values are compared and the gap is determined as abnormal values when exceeding the threshold.

### <Research Overview> 2011-2015
- Objective: Improvement on reliability of ATC system
- Theme: Study for Hybrid Surveillance System
- Structure: See below. Subsidized operation

### <Incorporation of ENRI Technology>
- Contributed as reference material for reliability assessment methodology while developing DAPs-ready SSR systems.

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https://www.enri.go.jp/info/nenpou/nenpou_index.htm

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