



International Civil Aviation Organization

SIP/2012/ASBU/Dakar-WP/16 B

# **Aviation System Block Upgrades**

## **Module N° B0-70/PIA-1**

### **Increased Runway Throughput through Wake Turbulence Separation**

Workshop on preparations for ANConf/12 – ASBU methodology  
(Dakar, 16-20 July 2012)

# Module N° B0-70

## Increased Runway Throughput through Wake Turbulence Separation



|                                     |  |               |
|-------------------------------------|--|---------------|
| <b>Summary</b>                      | <b>Improved throughput on departure &amp; arrival runways through revision of current ICAO wake turbulence separation minima and procedures.</b> |               |
| <b>Main Performance Impact</b>      | <b>KPA-02 – Capacity, KPA-06 Flexibility</b>   |               |
| <b>Domain / Flight Phases</b>       | <b>Arrival and Departure</b>   |               |
| <b>Applicability Considerations</b> | <b>- Implementation of re-categorized wake turbulence is procedural.<br/>- No changes to automation systems.</b>                                 |               |
| <b>Global Concept Component(s)</b>  | <b>CM – Conflict Management</b>  |               |
| <b>Global Plan Initiatives ( )</b>  | <b>GPI-13- Aerodrome Design; GPI 14 – Runway Operations</b>  |               |
| <b>Main Dependencies</b>            | <b>Nil</b>   |               |
| <b>Global Readiness Checklist</b>   |  | <b>Status</b> |
|                                     | <b>Standards Readiness</b>   | <b>2013</b>   |
|                                     | <b>Avionics Availability</b>   | <b>N/A</b>    |
|                                     | <b>Ground Systems Availability</b>   | <b>N/A</b>    |
|                                     | <b>Procedures Available</b>  | <b>2013</b>   |
|                                     | <b>Operations Approvals</b>  | <b>2013</b>   |



- ANSP applied wake mitigation procedures since 1990s
- 1990s standards are conservative in terms of required aircraft-to-aircraft wake separations:

## Changes to ANSPs applied wake mitigation procedures

- **Element 1 → Revision of current ICAO wake separation minima**
  - 20 year old wake separation standards still provide safe separation of aircraft
  - No longer provides capacity efficient spacing and sequencing of aircraft in approach and en-route operations
- **Element 2 → Increasing Aerodrome Arrival Operational Capacity**
  - Prior to 2008, instrument landing operations conducted to an aerodrome's CSPR needed the wake separation spacing equivalent to conducting instrument landing operations to a single runway
  - Variations of the procedure are being developed allowing its application to more aerodrome CSPR with fewer constraints
- **Element 3 → Increasing Aerodrome Departure Operational Capacity**
  - Wake Independent Departure and Arrival Operation (WIDAO) developed by France and Wake Turbulence Mitigation for Departures (WTMD) project developed by US allows the ANSP to use the inner CSPR for departures independent of the arrivals on the outer CSPR

# Module N° B0-70 – Intended Performance Operational Improvement



## **Capacity**

- Aerodrome capacity & departure/arrival rates raise as wake categories are increased from 3 to 6.
- New procedures will modify current wake mitigation measures of waiting for 2-3 minutes & decrease waiting time required.
- Aerodrome capacity & departure rates will increase.
- Runway occupancy time will decrease.

## **Flexibility**

ANSP chose to configure aerodromes to operate on 3 or 6 categories

## **CBA**

- Benefits the users of the aerodrome's runways.
- Air carrier data shows when operating from a major hub operation at a U.S. aerodrome, a gain of two extra departures/hr from the aerodrome's CSPR during the "rush" has a major beneficial effect in reducing delays in the air carrier's operations.

# Module N° B0-70 – Necessary Procedures (Air & Ground)



- ANSP will need automation support in providing the wake category assignment of aircrafts to controllers.
- Implementing Element 1:
  - no changes to air crew's procedures.
  - Impact on use of aerodromes CSPR for arrivals will affect the ANSP procedures for sequencing and segregating aircraft to the CSPR.
- Implementing Element 2 :
  - no changes to aircrew's procedures.
  - affects the ANSP procedures for sequencing and segregating aircraft to the CSPR
- Implementing Element 3:
  - no changes to the aircrew's procedures
  - affects the ANSP procedures for departing aircraft on an aerodrome's CSPR & for accomplishing a departure from the aerodrome.

# Module N° B0-70 – Necessary System Capability



- **Avionics**

- No additional technology for the aircraft or additional aircrew certifications is required.

- **Ground systems**

- Some ANSPs may develop a support tool to aid in the application of the new set of 6 category ICAO wake separates.
- Element 2 and 3 products vary on their dependency to newly applied technology.
- For WTMD implementation requires wind sensors and automation support to predict crosswind strength and direction and to display that information to the ATC

# Module N° B0-70 – Training and Qualification Requirements



- Controllers will require training on additional wake categories and separation matrix. The addition of Element 3, WTMD, will require training for controllers on the use of the new tools to monitor and predict cross-winds.
- Likewise, the qualifications requirements are identified in the regulatory requirements

# Module N° B0-70 – Regulatory/Standardization Needs and Approval Plan (Air & Ground)



- ❑ Regulatory/Standardization:
    - ❑ Updates required to current published criteria
  - ❑ Approval Plans:
    - ❑ To Be Determined following updates to standards.
- Note: Existing interim activities including those associated with FAA Wake Turbulence Mitigation for Departures (WTMD), and Wake Independent Departure and Arrival Operation (WIDAO) criteria in use at CDG will continue and are expected to be included in the ICAO revised material.

# Module N° B0-70 – Reference Documents

- Standards
- Procedures
- Guidance Materials
- Approval Documents
  - ICAO Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management*;
  - ICAO Doc 9426, *Air Traffic Services Planning Manual*;
  - FAA Order 7110.308.

### Increased Runway Throughput through Wake Turbulence Separation

#### Benefits - Main Key Performance Areas (KPA)

| KPAs       | Access | Capacity | Efficiency | Environment | Safety |
|------------|--------|----------|------------|-------------|--------|
| Applicable | N      | Y        | N          | N           | N      |

#### Elements:

- 1. Revision of current ICAO wake separation minima
- 2. Increasing Aerodrome Arrival Operational Capacity
- 3. Increasing Aerodrome Departure Operational Capacity

To be reflected in ANRF

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