

The need for Time Based Separation on Final Approach

Eurocontrol Wake Vortex Workshop

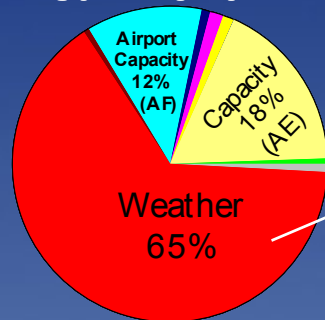
Bretigny November 2005

Andrew Shand - Manager ATM & CNS

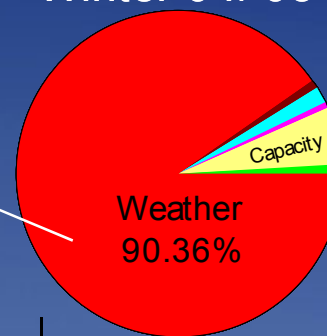
BRITISH AIRWAYS 

Impact of Weather on LHR Operation

Slot Delays
Summer 04



Slot Delays
Winter 04/05



Weather = 75%
of total inbound
Slot Minutes
for the Year

Jan-Nov 05
Weather = 70%

- Main issues = Strong Lower Winds & Low Visibility
& occasional snow/CBs
- Weather = c. 400,000 mins. (Excl RA Delays & Holding)
Plus schedule buffer 10-20 mins on 1st wave = 375 min per day
- Weather delays are not just a winter issue

Capacity = Excess Demand vs. Normal Airfield Capacity
Airport Capacity = Runway Capacity below Normal (Declared)

Weather Impact – Strong Lower Winds

- **Strong Lower Winds** - 30kts+ @ 1-3000ft
 - Reduces ground speed on final approach
 - Causes “catch-up” on base leg to final turn
 - Difficult for ATC to maintain spacing & even with perfect spacing, runway service rate falls
- **Reduced runway service rate results in flow rate to avoid excessive holding**
 - Typically results in prolonged flow of c.38 vs. 44*
- **Total Impact estimated at >12M Euro* for LHR alone (mitigated by TEAM**)**

**Tactically Enhanced Arrival Measures

*LHR - Based on cost of slot delays, reactionary delay, cancellations & holding

Overcoming the impact of wind on Final Approach

Normal Landing Rate – Light Headwind



Strong headwind reduces groundspeed

Normal Landing Rate – Light Headwind



Reduced Landing Rate – Strong Headwind



Time Based Separation

Potential to recover runway service rate

Normal Landing Rate – Light Headwind



Reduced Landing Rate – Strong Headwind



Time Based Spacing in Strong Headwind



Time Based Spacing

- Issues to resolve
 - ✓ • Wake Vortex Rules – less of an issue in strong winds
 - ✓ • Separation on runway – remains same
 - ✓ • Separation on final – function of ATC tool?
- Less likelihood of critically under-spaced arrivals & Increased spacing in light tailwind = Safety Enhancement
- Operational benefit is potentially huge

Will ADS-B provide the answer?

- Air to Air function of ADS-B will help repeatable separation **BUT.....**
- Dynamic determination of required vortex separation may still require ground based tool to calculate spacing
- Long lead time for implementation of Air-Air ADS-B function on sufficient aircraft
- In future could be phased-in to enhance operation

Ground Based Tool?

- Look at procedural changes immediately
- In parallel.....
- Develop tool - Dynamic advisory $f(n)$ for ATC:
 - Requires good quality Met.
 - Mode S DAPs mandated 2007 = good quality Met for ground systems (includes groundspeed/Airspeed/Alt)
 - LHR - updated 40+ times per hour (& that's just approaches!)
- Cost – potential to share development costs?
- To optimise it we may need better model of Wake Vortex persistence under differing conditions
 - We have a huge amount of data/experience already!!

Summary

- EUR RVSM & ATC Centre Development has reduced en-route delays
- Airport & TMA Delays are increasing & will ultimately dominate unless addressed
- Weather is major factor (70%+) in variability of airport capacity & strong lower winds account for c.50% of weather delays
- Time based separation based on ground tools & procedures could address this now

Q & A

