“DANS LIDAR wake vortex data campaign, deployment of Dependent Diagonal approaches and ongoing work to prepare RNP Parallel Approach Transition (RPAT) concept for implementation”

Roberto Ghidini
Dubai contest
LIDAR in Dubai
DANS Wake Vortex campaign
DXB Operations
Dependent Diagonal Approach implementation Phase
RPAT Approach concept development and Validation
Dubai contest

- Aviation is of significant importance to Dubai’s strategic plans; 28% of Dubai’s GDP is linked to the aviation sector.
- During the 1st Quarter of 2014 Dubai International (DXB) was the busiest in the world for international passengers.
- 65m pax accommodated in 2013 & approx. 2.4m tonnes of cargo.
- Dubai Airports has a strategic plan that will invest $7.8bn by 2020 to continue the growth of DXB.
- Dubai Air Navigation Services (DANS) provides Approach Radar for airports within the Dubai CTA and Aerodrome Control for DXB and DWC Airports.
Empirical wake data to be collected by 3 LIDARs

- 2 LIDAR to capture data for 30L approach (predominant landing runway)
- 1 LIDAR to capture data for 12L approach
- 2 LIDAR to capture In Ground Effect (IGE) wake data
- 1 LIDAR to capture Out of Ground Effect (OGE) wake data
DANS Wake Vortex Campaign

Modeling of wake behaviour

- Monte Carlo simulation to model OGE wake behaviour
- Model to be adjusted to Dubai environment and validated by LIDAR OGE data

Other wake activities

- Detailed investigation of all reported wake events
- Use of Flight Data Recorder data from Emirates and flyDubai to analyse aircraft behaviour during reports wake events
**LIDAR RWY 12L IGE data**

<table>
<thead>
<tr>
<th>Wake category</th>
<th>Total number of arrivals</th>
<th>Total number of ‘good’ tracks</th>
<th>%age giving ‘good’ vortex tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Heavy</td>
<td>261</td>
<td>207</td>
<td>79.3%</td>
</tr>
<tr>
<td>Heavy</td>
<td>1828</td>
<td>1409</td>
<td>77.1%</td>
</tr>
<tr>
<td>Medium</td>
<td>1237</td>
<td>857</td>
<td>69.3%</td>
</tr>
<tr>
<td>All</td>
<td>3326</td>
<td>2473</td>
<td>74.4%</td>
</tr>
</tbody>
</table>

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<th>Total number of ‘good’ tracks</th>
<th>%age giving ‘good’ vortex tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Heavy</td>
<td>16</td>
<td>12</td>
<td>75.0%</td>
</tr>
<tr>
<td>Heavy</td>
<td>82</td>
<td>49</td>
<td>59.8%</td>
</tr>
<tr>
<td>Medium</td>
<td>58</td>
<td>50</td>
<td>86.2%</td>
</tr>
<tr>
<td>All</td>
<td>156</td>
<td>111</td>
<td>71.2%</td>
</tr>
</tbody>
</table>

November/December 2013
### LIDAR RWY 30L OGE data

#### November 2013

<table>
<thead>
<tr>
<th>Wake category</th>
<th>Total number of arrivals</th>
<th>Total number of ‘good’ tracks</th>
<th>%age giving ‘good’ vortex tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Heavy</td>
<td>649</td>
<td>554</td>
<td>85.4%</td>
</tr>
<tr>
<td>Heavy</td>
<td>5184</td>
<td>4247</td>
<td>81.9%</td>
</tr>
<tr>
<td>Medium</td>
<td>3446</td>
<td>2216</td>
<td>64.3%</td>
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<tr>
<td>All</td>
<td>9279</td>
<td>7017</td>
<td>75.6%</td>
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</tbody>
</table>

#### December 2013

<table>
<thead>
<tr>
<th>Wake category</th>
<th>Total number of arrivals</th>
<th>Total number of ‘good’ tracks</th>
<th>%age giving ‘good’ vortex tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Heavy</td>
<td>868</td>
<td>694</td>
<td>80.0%</td>
</tr>
<tr>
<td>Heavy</td>
<td>6451</td>
<td>5144</td>
<td>79.7%</td>
</tr>
<tr>
<td>Medium</td>
<td>4616</td>
<td>3530</td>
<td>76.5%</td>
</tr>
<tr>
<td>All</td>
<td>11935</td>
<td>9368</td>
<td>78.5%</td>
</tr>
</tbody>
</table>
The Operational contest
Runways are spaced only 385 metres apart

Runway thresholds staggered by 1,900 metres

Current separation standards are Minimum Radar Separation or Wake Turbulence Separation

DXB daily traffic mix is unusual: 4% Super, 57% Heavy, 38% Medium

DXB is now the world’s busiest international passenger airport
Dependent Diagonal Approach implementation Phase

DEPENDENT APPROACHES USING 2.5 NM BEHIND ANY LEAD AIRCRAFT ON THE LEFT RUNWAY, EXCEPT A380s

- Concept Tested and Validated
- Wake data campaign to support safety case in place
- Expected implementation postponed to Q1 2015
- Q3 2014 DD approach will be implemented with ICAO+2,5NM separation on final
1. TURN TO FINAL – GS INTERCEPT
2. GS INTERCEPT – TOUCHDOWN
RPAT Approach Concept
development and validation

- RPAT procedure simulated by Emirates and Fly Dubai pilots during the feasibility phase
- RPAT procedure tested and validated by ATCOs
- Airspace concept to support the procedure under development
Key segments for RPAT

**FINAL SEQUENCING SEGMENT**
- ATC vectors traffic on downwind to their respective final approach courses

**MONITORING SEGMENT**
- ATC ensures separation of traffic on parallel approaches

**VISUAL SEGMENT**
- RPAT aircraft assumes responsibility for visual separation
Thank you