Steeper Approaches

Dr Darren Rhodes
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The need to reduce approach noise

- Approach noise is decreasing at a slower rate than departure noise
  - At Heathrow, between 2002 and 2012, total population exposure decreased by 8%, arrival population exposure decreased by 3.5%
  - Reductions principally driven my engine design (increasing BPR) often little to reduce engine noise on approach
- Noise from the airframe is increasingly a major contributor
- More people in the UK are affected by approach noise than take-off noise (within the 57dBA Leq contour):
  - Heathrow: 60% of population
  - Manchester, 69% of population
ICAO Balanced approach to noise management

- Reduction of noise at source
- Reduction through operational procedures
- Land-use planning
- Operating restrictions
Existing measures

* LP/ LD – Low power, low drag approach
Today, ICAO PANS-OPS states, that:

- a) glide path or approach angles should not require an approach to be made:
  1) above the ILS glide path angle;
  2) above the glide path angle of the visual approach slope indicator system;
  3) above the normal PAR final approach angle; and
  4) above an angle of 3° except where it has been necessary to establish, for operational purposes, an ILS with a glide path angle greater than 3°;

- Yet, ICAO did not adopt a preferred ILS glide path of 3 degrees until 1978 (up from 2.5 degrees), many years after 3 degrees was already a de-facto standard.
Slightly steeper approaches

- ‘Slightly steeper”
  - What we permit already, where required to meet obstacle requirements, ~30 airports in Europe with glide path angles between 3-4 degrees
  - Evidence suggests approximately 5-10% (avg 7%) reduction in noise footprint area for every 0.25 degree increase in glide path angle
    - At Heathrow 3.25 degree would give more noise improvement than fleet changes over the past ten years
- Frankfurt:
  - Introduction of dual ILS capability provided opportunity to Trial angles above 3 degrees
  - 3.2 degree CAT I trial since Nov 2012.
Beyond – Two segment approaches

- No aircraft yet certificated for CAT III autoland above 3.25 degrees, some aircraft limited to 3.15 degrees
- Stabilised approach at 1,000ft is a key safety requirement

- A steeper intermediate segment, say 4-5 degrees with a standard 3 degree final segment ensures retention of autoland capability
  - Transition above 1,000ft to ensure stabilised, no benefits close-in
- Requirement not to intercept glide path from above - intended in part to avoid false-glide path capture
  - Could alternative navigation technologies address this issue?
Two segment approaches: Challenges

- Energy management
  - Speed and height would need to be more carefully managed at entry to a steeper intermediate segment
  - Could be controlled using RNAV procedure design – but would give less operational flexibility
  - Compatibility with next generation of more aerodynamically efficient aircraft?

- ATC Operations
  - Intermediate phase based around radar vectoring
  - Steeper segment would preclude this, so aircraft would need to be sequenced much earlier in the approach phase than currently so
    - Different ATC tools/techniques and/or more airspace required?
Conclusion

- In line with the CAA’s strategic plan and its Environment programme, the CAA is keen to explore what can be done to improve environmental performance,
  - Generates benefits to consumers, the public and the environment itself
  - Significant challenges, but the potential benefits are significant
    - Believe there is a need for more ambition from industry to address approach noise
  - CAA is seeking to develop its evidence in this area in order to inform its policy
    - Recognises it is very dependent on industry for input