Noise Certification Workshop

Session 2: Aircraft Noise Certification History / Development

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AIRCRAFT NOISE CERTIFICATION HISTORY / DEVELOPMENT

- ICAO Noise Certification Historic / Standards Development
- Other Noise Certification Standards
- Difficulties for Aircraft Noise Certification
- Improvement of current situation

Standards developments

- Public reaction to jet noise aircraft started during years 1960 - 1965
- Resolution of sixteenth session of the Assembly, Buenos Aires, Sept 1968
- Special meeting in Montreal, Dec 1969

Standards Developments

- Draft international Standards and Recommended Practices / Consultation of States / Council / Annex 16 (1 st Edition) adopted 2 April 1971 (Chapter 2)
- The ICAO Annex 16 (1st edition) was applicable on 6 January 1972

Standards Developments

- During the same period : FAR Part 36 . Technical differences with Annex 16.
- First application on new subsonic aeroplanes with a MTOW > 34 t except PW JT3D (1st December 1969)
- Application to all aeroplanes with MTOW > 34t (1st December 1973)
- Application to all aeroplanes (31 December 1974)

ICAO Standards

- Period for application
  - Jets different dates referring to engine bypass ratio ~1972/Chapt 2
  - light propeller aeroplanes 1975/Chapt 6
  - Heavy propeller aeroplanes 1977/Chapt 5
  - Jets - Increase of stringency 1977/Chapt 3
  - Helicopters 1981/Chapt 8

ICAO Standards

- Relaxation of noise limits for helicopters 1985/Chapt 8
- Light propeller aeroplanes 1988/Chapt 10
- New chapter for light helicopters 1993/Chapt 11
- Harmonisation with FARs 1999
- Increase of stringency for light propeller aeroplanes 1999/Chapt 10

ICAO Standards

- Increase of stringency for helicopters
  2002/Chapt 8 and 11
- Increase of stringency for heavy aeroplanes
  2001 for 2006/Chapt 4
- Guidance material on tilt-rotor aircraft noise certification 2001

Annex 16 stringency steps Heavy aeroplanes

- 1971 Chapter 2

  Derived versions 1981 ~ 6 dB

- 1977 Chapter 3

  for light aeroplanes ~ 16 dB

  for heavy aeroplanes ~ 10 dB

- 2006 Chapter 4

  10 dB referring to Chapt 3

Annex 16 increase of stringency

- Light aeroplanes (single engine):
  - 6 dB for lights and 3 dB for heavy

  No increase for light twins
- Helicopters: (Chapter 8)
  - 3 dB for take off , 4 dB for overflight and

  1 dB for approach

Current standards for noise certification

- ICAO Annex 16.
- FAR Part 36 (USA) ~ harmonised with the Annex 16
- JAR 36 (JAA) = Annex 16
- CS 36 (EASA) = Annex 16
- AP 36 (Russia) ~ old FAR Part 36,but new certifications with Annex 16

Status for noise certification

- Harmonisation of different standards, good level of stringency.
- All things are ok in the best of worlds?
- NO, due to complexity of rules, practices, equivalencies, different interpretation of rule, big difficulties specially for heavy aeroplanes.

Difficulties for noise certification

- Demonstration procedures described in Chapter 3 , Appendix 2, not necessary applied, but use of equivalent procedures.
- Development of the Environmental Technical Manual.
- Aircraft more and more complex regarding noise sources.
- More and more modifications on engines.
- Family concept development.

Difficulties for noise certification

- Family concept: original flight test and engine static tests of original engine type, then engine static test of modified engine. Differences applied to flight test results. Method very complicated.
- Engine modifications evaluated by engine static tests, but in case of small noise impact, use of techniques for noise impact evaluation not described in Annex 16 or Technical Manual (near field).

Difficulties for noise certification Technical point of view

- Necessity for high level of technical expertise.
- More and more noise certification presents two aspects:
  - To satisfy ICAO Annex 16 Chapter and obtain a Noise Certificate.
  - To satisfy airport local rules by reference to certificated noise levels.(example: Chapter 3 limits minus 5 dB or minus 8 dB).

Difficulties for noise certification Administrative point of view

- Annex 16, Chapter 1, « Administration » paragraph 1.2:

« Noise certification shall be granted or validated by the State of Registry of an aircraft on the basis of satisfactory evidence that the aircraft complies with requirements which are at least equal to the applicable Standards specified in this Annex. »

Impact of a wrong expertise

- Create distortion of competition.
- Create problems with people living around airports.
- Decrease the confidence about noise certification rigour.

Example of wrong expertise

- Deliver a noise certificate for other slap/slat deflexion in approach than aircraft noisiest configuration for heavy aircraft. Noise levels are in this case complementary information, not certification.
- Other examples presented in Session 2 presentations.

Improvement of current situation

- This workshop is an element of tools developed to progress in way of harmonisation between certificating authorities to arrive to a common noise certification expertise.

AGENDA FOR NOISE CERTIFICATION WORKSHOP PRESENTATIONS

- Annex 16, Volume 1 and Equivalent Procedures
- ICAO Environmental Technical Manual
- Roles & responsibilities
- Harmonisation


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Thank you