Noise Certification Workshop

Session 3 : Aircraft Noise Re-certification

History

Alain DEPITRE  DGAC FRANCE
Noise Re-certification / History

- Noise re-certification: why?, when?
- Needs for re-certification.
- Standards for re-certification
- Experience with re-certification to Chapter 3
- Current situation
Noise Re-certification: why?

When?

➤ At the beginning of the process:
  ➤ To satisfy the regulation in case of phase-out.
  ➤ To decrease certified noise levels to satisfy local rules.
  ➤ To be economically competitive.
  ➤ To determine new noise levels in case of aircraft/engine modification.
Needs for Re-certification

- Re-certification from Chapter 2 to Chapter 3 during Chapter 2 phase-out
- No ICAO rules or guidelines
- Development of Re-certification technical guidelines initiated by the JAR 36SG and ECAC
Standards for Noise Re-certification

Re-certification definition:

Certification of an aircraft with or without a revision to its certification noise levels, to a Standard different to that to which it was originally certificated.
Recertification definition:

Question: is new calculation of certificated noise levels in a same Standard a re-certification?

NO, apply new calculation methods to recalculate certificated noise levels in a same Chapter is not a Re-certification but a new evaluation of noise levels.
Standards for noise
Re-certification

- Re-certification taken into account in Annex 16, Amendment 7 for noise re-certification to Chapter 4
Standards for noise
Re-certiﬁcation

➤ Level of accuracy for a Noise Re-certiﬁcation:

➤ It 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 the Annex 16
Standards for noise
Re-certification

Aplicable Standards:
The date used by a certificating Authority to determine the Re-certification basis shall be the date of acceptance of the first application for Re-certification.
Montreal, October 2004

Historic of Chapter 2 phase out

➤ Phase - out application: 1st April 2002.
  ➢ MTOW of 34 t or more
  ➢ Or more than 19 passenger seats.
➤ Re-certificated civil subsonic jet aeroplane
  ➢ Modified to meet Chapter 3 Standards
  ➢ Re-engined aircraft with engines having a by-pass ratio of three or more are not considered as re-certificated aeroplanes.

Montreal, October 2004
Technical solutions for Re-certification
Chapter 3 experience

- **Non modified aircraft**
  - Aircraft limitations: MTOW, MLW, flap deflection, thrust derate,…

- **Modified Aircraft**
  - Huskitted aircraft: new flight tests, but not with same accuracy in demonstration than initial certification demonstration, aircraft limitations, overspeed, cutback power in sideline…
Re-certification problems

- Difficulties to know the technical step regulation to apply.
- Initial data obtained with techniques which were rejected few years after.
- Agreements or not from certificating authorities due to noise specialists experience.
Re-certification problems

- For re-certification to Chapter 3, situation of no technical re-certification guidelines conducted to different decisions from Authorities for same aircraft types.

- Problems of competition between airlines appeared.

- Noise monitoring systems on airports showed noise problem for some re-certificated aircraft, then suspicion on noise certification came.
Re-certification experience

- Significant margin differences to new Chapter limits for new Aircraft types and re-certificated Aircraft
  - to Chapter 3: 16 to 18 EPNdB for B737-600
    - 12 to 17 EPNdB for B737-700
    - 22 to 25 EPNdB for A340
    - 0.1 to 3 EPNdB for re-certificated aircraft

- Conclusion: the work conducted for noise re-certification will be at least at same level of accuracy than for noise certification.

Montreal, October 2004
Re-certification experience
Non modified aircraft

Definition of non modified aircraft.

Is an aircraft with a flap deflection limitation a modified aircraft?

Differences in procedures between test period and current period. Original tests conducted 20 / 25 years ago.

Question: « do we have to apply 25 years ago Annex 16 rules, or today's rules? »
Re-certification experience
Non modified aircraft

➔ Original demonstration by flight tests only.

➢ Data re-analysed in regard of requirements at the date of application for re-certification.

➢ Presentation of dossiers with no new analysis.
Re-certification experience
Non modified aircraft

- Original demonstration by the « family concept »
  - Flight tests for the parent aircraft.
  - 2, 3, 4, 5 engine noise static tests.
  - Beginning of engine noise static tests
    - *No inflow Control Devices (ICD or TCS)*
    - *Ground: no concrete*
    - *Microphone height 8m and not inverted microphones*
Re-certification experience
Non modified aircraft

→ Confidence in noise levels
  ➢ Limits on residual
    ✤ Residual: difference in EPNdB between flight noise level and static to flight noise level.
  ➢ Limits on IC 90% linked with each certificated noise level.

→ Conclusion:
  ➢ Uncertainty on re-certificated noise levels more large than margin between noise levels and Chapter 3 limits.
Re-certification experience
Non modified aircraft

▸ Aircraft limitations
  ➢ Maximum take-off weight
  ➢ Maximum landing weight
  ➢ Flap deflection in Approach
  ➢ Thrust de-rate
Re-certification experience
Modified aircraft

- Aircraft with modified engines to reduce noise
  - Very small margins to chapter 3 limits (use of trade-off)
  - New flight tests
Re-certification experience
Modified aircraft

- New flight tests
  - Demonstration methods using simple means
  - Notion of overspeed (artificial increase of V2)
  - Cutback power in sideline
  - Aircraft limitations
  - For heavy propeller driven aeroplanes, reduction of RPM in approach, notion of aeroplane in noisiest configuration not enforced
Re-certification Experience

Conclusions:

- Re-certification could be more difficult to conduct than original certification.
- Necessity of involvement for noise specialists with a long experience.
- Experience of the past taken into account for Re-certification to Chapter 4.
- Presentation by other colleagues of all material developed by ICAO to conduct Re-certification to Chapter 4 in good conditions.
Current situation for Noise Re-certification

- No Chapter 3 phase-out
- But voluntary re-certification to
  Chapter 4 from Chapters 3/5, from Chapter 2, from Stage 3.

Local rules
- Chapter 3 – 5 dB, Chapter 3 – 8 dB. No re-certification, but re-evaluation.
Thank you