



Noise Certification Workshop

Session 3 : Aircraft Noise Re-certification History

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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.

Standards for Noise Re-certification

☀ 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
- ☀ Development of guidelines in the Environmental Technical Manual

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

☀ Applicable Standards:

- The date used by a certifying Authority to determine the Re-certification basis shall be the date of acceptance of the first application for Re-certification.

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.

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.

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 rule , or to day rule? »

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 V_2)
 - ✱ 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.

