NOISE CERTIFICATION WORKSHOP

(Montreal, 20 to 21 October 2004)

SESSION 3 : AIRCRAFT NOISE RE-CERTIFICATION

MANUFACTURERS' PERSPECTIVE

(Presented by ICCAIA)

SUMMARY

This paper presents the manufacturers view of the role and merits of the noise certification regarding aircraft design, measurement of acoustic performance and alleviation of the airport noise problems. Then considering the implementation of the new ICAO Annex 16 Chapter 4 noise standards the purpose of re-certification, the rationales that have lead to the development of assessment criteria and re-certification scheme and, through examples, the benefits of applying re-certification are explained.

1.   **NOISE CERTIFICATION**

1.1.   Compliance with certification standards must be demonstrated prior to entry into commercial service of any aircraft type and model. For many years, the acoustic design goal at the launch of every product has been based on the EPNL values established during the noise certification process. The targeted certification noise levels are part of the top-level aircraft requirements at the beginning of its development. Aircraft manufacturers therefore view the noise certification as a key element in aircraft design.

1.2   It is also a unique means of measuring aircraft acoustic performance as quality-control criteria to qualify the design, development and production of an aircraft for its take-off and landing noise performance.

1.3   Continuous evolution of the noise demonstration process towards more accuracy and standardization has been achieved by incorporating:

>   a)   improvements in the understanding of noise generation and propagation;

>   b)   improvements in measurement techniques;

>   c)   improvements in computation models accuracy and physical representation;

>   d)   accommodation of new technologies; and

e)   continuous application of lessons learned.

1.4   The current certification scheme serves to achieve uniform methods for assessment of individual airplane type source noise.

1.5   Relative to the balanced approach to airport noise management:

a)   compliance with noise certification Standards ensures noise reduction at source;

b)   when combined with other appropriate measures, within the framework of the balanced approach, the current certification scheme contributes to reducing the number of people exposed to significant levels of aircraft noise;

c)   operating restrictions, if and when unavoidable, must be in accordance with the ICAO corresponding recommendations and guidance, and in particular, they should be based on certificated noise levels. The Chapter 4 standard is applicable to all subsonic jets and transport category propeller-driven aeroplanes, including their derivative versions, for which the airworthiness certification application is accepted on or after 1 January 2006. It must not be used as the basis for phase out of aircraft certified to an earlier standard (e.g. Chapter 3).
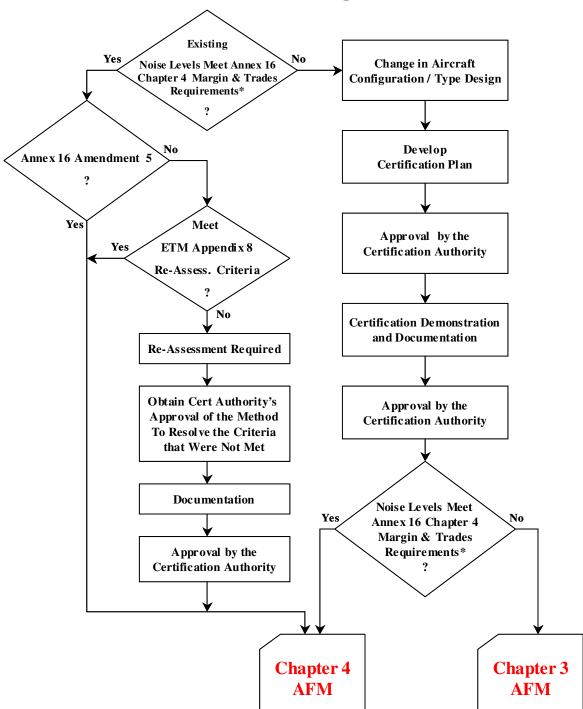
2   NOISE RE-CERTIFICATION

2.1   Re-certification is defined as the certification of an aircraft, with or without revision to noise levels, to a standard different to that to which it had been originally certified.

2.2   The adoption of Chapter 4 noise certification standard led to an interest in the assessment of existing aircraft against that new standard, and to a willingness to ensure that a consistent methodology is applied. Many aircraft operators and manufacturers are interested in re certifying their aircraft to increase equipment/asset value, in particular those previously certified Chapter 3 that already meet the more demanding conditions of the Chapter 4 standard.

2.3   The assessment criteria elaborated for re-certification to Chapter 4 aim at:

a)   harmonization of requirements for demonstration of compliance of existing airplane noise levels with the Chapter 4 standard;

b)   maintaining a consistent noise performance reference applicable to the entire civil air transport fleet; and

c)   consistency of actions by all authorities in granting Chapter 4 noise certification status.

2.4   The re-certification to Chapter 4 standard may be an opportunity to demonstrate better certificated noise levels to improve operability of the fleet at a reasonable cost and capitalize on a potentially advantageous future operational environment for Chapter 4 aircraft.

2.5   This can be achieved for example by:

a)   optimization of data analysis in accordance with latest amendments to the noise certification standards (ICAO Annex 16 and FAR 36);

      b)   changes to airplane's certified configuration (Engine power, Flaps, etc.) in conjunction with operational limitation;

      c)   lower airplane maximum takeoff/landing weights;

      d)   implementation of noise reduction devices; and development of new noise data.

2.6   As noise reduction technologies with broad applications continue to develop and mature, a number of these technologies will be suitable for implementation on certain existing aircraft.

2.7   As market opportunities arise, manufacturers incorporate hardware changes in their products in pursuit of lower certification noise levels.

2.8   Certified noise levels of some Chapter 3 aircraft have already been successfully reduced to meet the demanding, low levels of the Chapter 4 standard.

3.   **CONCLUSION**

3.1   Manufacturers consider noise certification as a unique and efficient means of measuring aircraft noise performance.

3.2   A new design standard must not be used to discriminate against existing aircraft.

3.3   Manufacturers have been supporting the development of the re-certification scheme. Re-certification plans for a number of Chapter 3 aircraft types are in development.

3.4   Some Chapter 3 airplanes already incorporate modifications with new noise reduction features to meet the low noise levels of Chapter 4 standard.

Roadmap for Subsonic Jet Airplane
Re-Certification to Chapter 4

Existing Noise Levels Meet Annex 16 Chapter 4 Margin & Trades Requirements* ?

- Yes → **Annex 16 Amendment 5 ?**
- No → **Change in Aircraft Configuration / Type Design**

Annex 16 Amendment 5 ?
- No → **Meet ETM Appendix 8 Re-Assess. Criteria ?**
- Yes → Chapter 4 AFM

Meet ETM Appendix 8 Re-Assess. Criteria ?
- Yes → Chapter 4 AFM
- No → **Re-Assessment Required**

Re-Assessment Required
→ **Obtain Cert Authority's Approval of the Method To Resolve the Criteria that Were Not Met**
→ **Documentation**
→ **Approval by the Certification Authority**
→ **Chapter 4 AFM**

Change in Aircraft Configuration / Type Design
→ **Develop Certification Plan**
→ **Approval by the Certification Authority**
→ **Certification Demonstration and Documentation**
→ **Approval by the Certification Authority**
→ **Noise Levels Meet Annex 16 Chapter 4 Margin & Trades Requirements* ?**

Noise Levels Meet Annex 16 Chapter 4 Margin & Trades Requirements* ?
- Yes → **Chapter 4 AFM**
- No → **Chapter 3 AFM**

Chapter 4 AFM

Chapter 3 AFM

***Chapter 4 margin and trade requirements:**

- Minimum of 10 EPNdB cum. margin re: Chapter 3 limits
- Minimum 2 EPNdB at any two certification points
- No Trades