inter·noise 83

NOISE CONTROL IN LATIN AMERICA

G.L. Fuchs

Centro de Investigaciones Acústicas y Luminotécnicas (CIAL)
Ciudad Universitaria-Estafeta 32 -(5000)Córdoba, Argentina

The massive diffusion of technical information is closing the gap science-technology. In developing countries buildings, industry and environment noise control is postponed by chronic socio-economic instability rather than by lack of know-how.

We consider that noise control must be based on two fundamental parameters: 1) adequate acceptability criteria; 2) good acoustic design. Criteria have been based on annoyance a term difficult to quantify due to semantic difficulties and emotional contents. Rather activity interference effects should be reasonably correlated with objective indices.

Good acoustical design not only eliminates the negative aspects of noise by correlation but creates agreeable environments where speech, music and rest can be enjoyed. Prof. Lara Saenz of Spain and the author have done analytical research which permits acoustical design to avoid need of later corrections.

The main problem in Latin America is to convince decision-makers, engineers and the public that noise deteriorates the quality of life as much as any pollutant.

We can claim some success in this direction since 1965, when GALA was founded and triennial Latin American Meetings have taken place in several countries. The main deterrents have been lack of governmental support and shortage of specialists due to the absence of curricula at technical and University levels.

Widespread use of glazed façades and lighter partitions

aggravate the lack of acoustic insulation and privacy.

Local acoustical research has allowed the design and use of high insulation heterogeneous partitions a typical model of which is shown in Fig. 1. Latin America had long relied on massive construction and little incentive is available for developing locally insulative and absorbing acoustical materials. A recent survey in Argentina confirmed this.

We have introduced the use of floating floors in the Building Code some 10 years ago with very limited success due to lack of control.

We are developing simplified measurements of airborne and solid-borne isolation (Ref. 1). A one (grylon) hammer tapping machine is under test and correlates well (with multistory tenants for the usual flooring systems (wood, tile or carpet over concrete slabs with or without floating.

Prospects of application have improved through pressure from owners for better acoustic isolation. Remote transmission of impacts and vibration is now controlled by structural discontinuities and damping treatments.

Theoretical knowledge of acoustic radiation and interaction of flexural waves with structures are all important for good acoustical design (Ref. 2). Heckl and Buhlert's research on simple relations between solid excitation (measured particle velocity) and sound field pressures resulting from radiation of structures into enclosures have helped improve these damping treatments. Plates radiate efficiently above coincidence frequency (Fig. 2). These findings are mostly at laboratory level in Latin America and probably even in well developed countries.

Industrial noise presents higher levels (generally well above 90 dB(A)) and powerful vibrations which require action at the source and highly insulating partitioning and control cabins. Structural propagation computed by S.E.A. is not easy to control, except for section discontinuities and damping.

Radiation level ($10 \log \sigma = L_E - L_{\bar{E}}$) can be reduced only at the source-emitting areas. In Latin America this is mostly attained by rigidification and encapsulation of vibrating areas.

Personal protection, especially inserts and earmuffs, are compulsorily used in many noisy areas throughout Latin America's industries. Legislation has generally adopted the equal energy principle (q=3) and 90 dB(A) over 8 hours

daily in a 45 hs work week.

Coming back to acceptability criteria, Prof. Lara and I have proposed a simplified scheme (Fig. 3) relating environments, activities and acoustical sensitivities related to the simplest indices for each type of exposure.

For impulsive noises which are most difficult to control we generally take C.H.A.B.A.'s limits based on peak pressure, duration and number of daily impacts (Ref. 3).

Most factories were built without acoustical considerations but legislation and pressure from trade unions has brought about considerable improvement over the last 20 years.

Noise labelling of machinery is scarce and generally stated for large imported power plants.

To conclude and reflecting on the limited success of noise control, especially environmental, we would like to mention a sort of negative public attitude to campaigns and even to regulations. It seems likely that the public's informational channels are overloaded by non-acoustical information so the signal-to-noise ratio becomes highly negative (Ref. 4) Then a rejection response is to be expected towards noise. In Latin America this information oversaturation may be higher than in long established communities.

Meanwhile, our best contribution may be to put pressure towards better acoustical design rather than adding to existing legislation and elaborate control systems thus generating resistence where we seek obedience.

REFERENCES

1. G.L. Fuchs & N.T. Stasyszyn "Airborne and Impact Level Criteria for Buildings", Applied Acoustics Vol.12 page 187 to 194, 1979.

2. Cremer, Heckl & Ungar; "Structure-borne sound" Springer Verlag 1973.

3. C.H.A.B.A. Committee on Hearing of the National Academy of Sciences (U.S.A.)

4. E. Colton; "On Overloading Society's Acoustic Communication Channels", Paper C.2 - 1.2, 10th International Congress on Acoustics, Sydney, Australia 1980.-

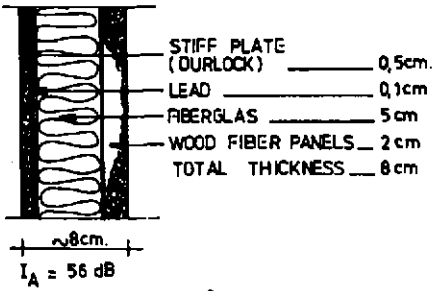
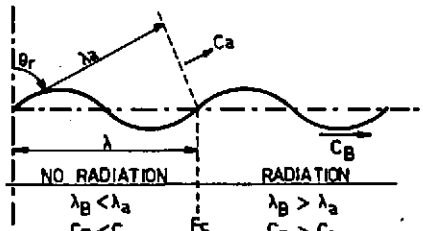


Fig. 1



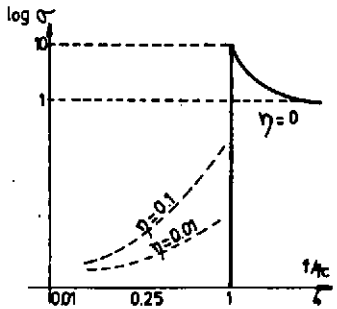


Fig. 2

ACOUSTIC DESIGN CRITERIA

1		2	
FUNCTIONS	ACOUSTIC RELATED ACTIVITIES	SENSITIVITY TO NOISE	CRITERIA dB(A)
industrial plants (machinery) vehicles (transportation)	communication and warning signals	low	$L_{eq(8)} \leq 70$
arts and crafts business and administration urban services social activities	simple mental tasks	medium	$L_{eq(8)} \leq 50-60$
creative work learning and cultural	complex mental tasks	high	$L_{dn} \leq 40-50$
a) health care b) sleep c) sound recording and playing	recovery periods listening	critical	$L_{dn} \leq 40$

After A. Lara Saenz and G. L. Fuchs Fig. 3