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ROAD TRAFFIC NOISE INFLUENCED BY ROAD BUMPS

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Noise levels from different kinds of vehicles were measured on streets close to road bumps. In comparison with free flowing traffic, the acceleration after road bumps increased peak noise levels from 1 to 13 dB (A) max. Although the results are of a pilot nature, it is suggested that noise consequences should be included in the planning of road bumps.

1. BACKGROUND

To decrease the risk for accidents and noise exposure, a reduction of the vehicle speed is an important practical action that is increasingly introduced. The relation between the speed of vehicles and the noise levels is well known—up to about 50 km/h the engine noise dominates and above 50 km/h, the tire noise becomes the dominant noise source.

To decrease the speed of vehicles in city traffic, road bumps can be used. These require the vehicle to slow before the bump and usually it increases the speed after the bump, adding an accelerating engine to the noise sources. The potential increase in noise levels during "aggressive" driving is illustrated from our own measurements in Figure 1.

To evaluate the consequences of speed bumps in terms of road traffic noise exposure, a pilot study on road traffic noise was performed in city streets in Gothenburg under free flow conditions and when bumps were present.

2. MATERIAL AND METHODS

Two streets with a maximum speed of 50 km/h were selected for the study. Measurements were made in a section without any obstacles and in a section shortly after road bumps.

The maximum noise level from each passing vehicle type was manually recorded using a Brüel and Kjaer noise level analyzer (B&K 4426) and the vehicles were classified as passenger cars, light lorries and lorries. In that particular street, no buses were present.

3. RESULTS

The results are reported in Table 1.

It was found that maximum noise levels were 77–86 dB (A) during uninterrupted traffic flow, depending on the vehicle type. The value was 1–13 dB (A) higher when road bumps were present with the highest increase caused by passenger cars. The increase in maximum

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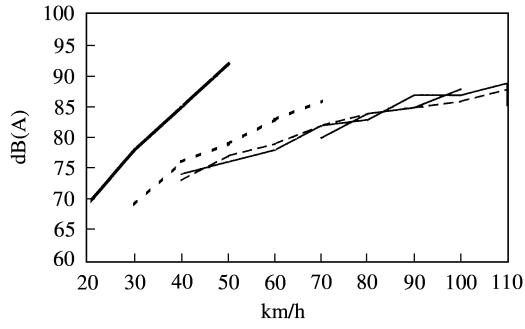

Figure 1. Noise level from passenger car in relation to gear and speed. Gear: ——, first; - - -, second; ——, third; – – –, fourth; ——, fifth.

TABLE 1

Average and maximum noise levels from passenger cars, light lorries and lorries in street

Type of vehicle	No bump	Bump
Passenger car		
Number measured	33	67
Average dB (A)	73	74
Max dB (A)	77	90
Light lorries		
Number measured	7	32
Average dB (A)	74	73
Max dB (A)	78	81
Lorries		
Number measured	10	19
Average dB (A)	82	82
Max dB (A)	86	87

noise level from passenger cars corresponds to the noise level caused by an increase in vehicle speed of about 50 km/h (see Figure 1).

There was no increase in the average noise level for the different types of vehicles.

4. COMMENTS

The study is based on a limited number of measurements and should be regarded as hypothesis generating rather than giving results that can be generalized.

The interpretation of the results depends on what principle is applied. If the average value is taken to represent the relevant exposure dose, there was no influence of road bumps. If, on the other hand, the maximum noise level from certain vehicles is taken as the relevant dose descriptor, the results suggest that road bumps increase noise levels from passenger cars. There is still considerable debate as to which principle should be used to describe the road traffic noise exposure from the human reaction point of view. A recent study on road traffic noise reported that the maximum noise level in a mixed road traffic noise situation was the most important determinant for the extent of annoyance [1].

The results relate to our previous studies where "aggressive" driving was found to cause higher noise levels. The reason for the increased levels from passenger cars passing road bumps would thus reflect acceleration and wish by the driver to regain the speed reduced by the bump. Drivers of lorries, on the other hand, would not show the same behavior, at least not according to the material presented here.

If the results could be verified in future studies, they suggest that the noise consequences must be taken into consideration when bumps are introduced for road traffic speed control purposes.

REFERENCES

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