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Motorcycle Noise – Part II

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1. Introduction

In a previous article, we discussed some aspects of the noise generated by a motorcycle, namely its generation and the effect on people exposed. We did point out that, due to the duration of the phenomenon, this noise can be classified as “annoying” and there should be no hazard of permanent noise induced hearing loss. This, of course, does not apply to people involved in motorcycle maintenance, who may be exposed on an occupational basis, for an entire work shift, 5 days a week.

Another exception is those attending motorcycle racing events. There too the noise levels and the duration of the exposure can present hearing hazard to the attendees.

2. Riding a Motorcycle

Now, what is the situation of the person riding the motorcycle? Obviously, he is exposed to the engine noise all the time the engine is on. Also, he is much closer to both the engine and the exhaust (silenced or not). The result is a higher noise levels for longer time periods, and a potentially hazardous situations.

Surprisingly enough, engine/exhaust noise is not the main hazard motorcycle riders are exposed. There is another source, that is more serious, consisting in the aerodynamic noise created by the turbulent airflow around the helmet—the so-called wind-noise. Several studies were done using essentially similar techniques: a miniature microphone is placed at the rider's ear under the helmet and sound levels are measured in various riding conditions. All these studies show excessive wind noise around the helmet—about 90 dB(A) at 60 km/h and increasing linearly when plotted against the log of speed, to reach 110 dB(A) at 160 km/h!

Hearing loss in motorcyclists has been confirmed as is temporary threshold shift after only 1 hour of high-speed riding and a corresponding subjective complaint of tinnitus. After long periods at high speed, riders commonly report other non-specific complaints such as fatigue, headache and even disequilibrium.

3. Attenuation of the Helmet

Does the helmet provide some attenuation to the rider? The answer is “no”. Modern helmets offer very poor low-frequency sound attenuation. There is also a phenomenon of resonance at 250 Hz. The source is a turbulent boundary layer, vibrating against the outside of the helmet shell, with its maximum sound energy focused between 250 and 500 Hz. Probably the best protection is still the use of earplugs.

4. In Summary

Broadly, there are two types of motorcyclists—amateur and professional. Professional riders can

be further subdivided into racers, dispatch riders and police motorcyclists. Motorcycle noise hazard is basically dependant on the speed and duration of the ride. It is important for the hearing professional, when preparing the medical history of the patient, while asking about noisy activities to include questions about use of motorcycle either as a recreational or professional tool.

Bibliography

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