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The Concept of Assessing the Annoyance of Industrial Process Noise Using Subjective Sound Features Modeling*

Waldemar PASZKOWSKI and Krzysztof LEDWON

Politechnika Śląska, Gliwice, Poland

Correspondence should be addressed to: Waldemar PASZKOWSKI, waldemar.paszkowski@polsl.pl

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Abstract

The article presents a research concept for assessing noise annoyance in industrial environments. The approach used for both noise evaluation and noise annoyance assessment is based solely on the application of physical parameters of the acoustic signal, describing changes in the sound pressure level over time. The proposed concept relies on a multidimensional approach to assessing noise annoyance, which combines acoustic criteria for machines and rooms with psychoacoustic aspects. In particular, the authors propose the use of models of subjective sound features represented both in the time domain and in the Bark auditory frequency scale.

The most important legal act currently applicable in the field of noise monitoring and management is the EU Directive, which introduces a noise index for assessing general annoyance and sleep disturbance, based on long-term noise indicators corresponding to specific times of day. For traffic noise sources, it can generally be assumed that as the loudness of a given source increases, the impression of noise annoyance also increases. In the case of industrial noise sources, this dependency does not occur. At identical sound pressure level values, industrial noises turn out to vary significantly in terms of perceived annoyance.

The proposed concept consists in linking the assessment of acoustic quality for machines and rooms with models of physical and subjective sound characteristics. The presented solution will contribute to the development of effective strategies for the design and operation of machines in terms of acoustic criteria, ultimately improving employee comfort and enhancing the acoustic environment of industrial processes.

Keywords: Noise annoyance, psychoacoustic, acoustic quality.

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