

## **Evaluation of a perceptual model for engine roughness**

Evaluierung eines perzeptiven Modells der Motorrauigkeit

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The roughness-induced perception, varying from a sporty character to a very unpleasant impression, proposes consistently new questions and challenges in sound engineering. To achieve an optimized product sound at an early stage of development, subjective evaluation methods must be combined with analysis and prediction tools to provide reliable information relevant to product quality judgments. Existing roughness models work well for synthetic signals such as modulated tones or noise signals, but it is challenging to predict roughness for engine sounds because of their more complex spectral and temporal noise patterns. Some years ago, a "Hearing Model" was developed explaining and describing many psychoacoustic effects, and allowing for roughness calculation of synthetic and engine sounds in accordance with subjective listening tests. Recent studies were used to improve the roughness calculation based on the "Hearing Model" with respect to technical sounds and to determine the necessary accuracy of roughness measurements.

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