

## **A Method for NVH Quality Rating of Diesel Combustion Noise Using Typical Driving Modes**

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Along with the performance of diesel engines in passenger cars, the NVH quality is a major requirement for good placement of the vehicle in the market. Due to the varying driving behavior of cars from different segments, and the diverse driving and traffic situations, it is an ambitious goal to classify the NVH behavior of a diesel engine.

Hence a method has been developed which evaluates diesel combustion noises that occur during typical driving modes. When dealing with the issue of assessing the sound quality of diesel engine noises with special regard to the perceptual relevance of the noise in real drives, the following questions had to be answered first:

How do people drive with diesel vehicles?

In which driving situations diesel combustion noise is apparent or even is leading to annoyance?

Which combustion noise is evaluated as acceptable or excellent and which as unacceptable?

To answer these questions a suitable test course has been determined that includes typical driving situations with respect to European driving behavior. Vehicles of different segments were driven by a group of test persons on a defined course. The recorded driving style and the given comments on the diesel combustion noise were used to develop a driving mode with high acoustic relevance to diesel combustion noise.

The next step was to simulate this driving mode on a chassis dynamometer for acoustical measurements. The recordings of several vehicles were evaluated in listening tests in order to identify a metric based on objective analyses that reliably evaluates the diesel combustion noise in relevant driving situations.

For effective analysis of the results from different driving situations, in terms of their prominence, frequency of occurrence, perceptual significance and sound quality, a special chart technique is used.

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