Identification and evaluation of brake noise events with advanced robustness and confidence by using psych-acoustics

Dr.-Ing. Peter Blaschke, HEAD acoustics GmbH

Although generally brake systems have arrived at a very high performance level, car manufacturers are confronted with an increasing number of customers' claims on annoying brake noise. Especially squeal and moan noises are objects of complaints. The rising customer expectations force systematic testing of brake acoustics. This goal is strongly supported by mobile brake data acquisition systems able to detect and store automatically brake noises together with brake-relevant parameters. Essential requirements for such systems are illuminated here divided into the following categories:

- **Hardware requirements:** Important hardware properties are enumerated. Since mobile data acquisition systems are used under challenging ambient conditions, robustness plays an important role.
- **Visualization**: In order to handle different user requirements the graphical user interface (GUI) has to be configurable.
- **Triggering**: Three different triggering modes are presented: the brake parameter trigger, the manual trigger, and a signal inherent trigger mode.
- **Detection algorithm:** The basic task of the automated detection of brake noises is to store only those brake noises that are perceived by future customers, too. It is shown that psychoacoustic approaches independent of absolute level thresholds are needed to yield detection results consistent with human perception. A method to assess the quality of the detection algorithm is presented.