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Title: Need for Sound – Why is Sound and Vibration Important in a Driving Simulator?

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Abstract:

The automotive industry invests a lot of money and effort in NVH (noise, vibration, harshness) because the perceived quality is directly linked to the acoustic quality. A confident door closing sound conveys a safe car and a powerful engine sound sets emotions to a sports car driver. Authentic sounds and vibrations are essential to increase the immersion in a driving simulator. Furthermore, a driving sound simulator, an interactive playback of binaural sounds and vibrations of powertrain, tire-road and wind noise is also a powerful tool in the NVH development.

Applications are benchmark, target sound setting and decision-making-support. Higher costs and shorter development cycles are the reasons that car manufacturers are reducing the number of prototypes. A virtual prototype based on the combination of test data and CAE data can be experienced in a driving sound simulator to judge the sound quality as early as possible. Artificial engine sounds are played back in electric and hybrid vehicles using cabin loudspeakers to set emotions or give acoustic feedback. In a software-in-the-loop or hardware-in-the-loop approach the sound generating device can already be tuned in the simulator considering the masking noise by wind and tire-road noise. Another aspect is evaluating the sound of the future. Studies could be performed if passengers are more sensitive to noise while they relax during automated driving.

Keywords: Driving Sound Simulator, NVH, Sound and Vibration, Virtual Prototype, Acoustic