

# Vibration and sound analysis

The NVH of a motorhome was recently evaluated on different surfaces using this complete measurement front-end system

**m+p international**

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NVH testing and analysis is becoming more important for the development and troubleshooting of all kinds of vehicles. Interior noise perceived in the passenger cabin is one of the most important factors in a customer's determination of the total quality of the vehicle and largely influences his buying decision.

In a recent measurement program, engineers from m+p international studied the NVH behavior of a motorhome. Structural vibrations and sound pressure were recorded to analyze the vibrational behavior on different road surfaces such as asphalt, cobblestone and gravel. For this purpose, the engineers equipped the motorhome with accelerometers on the windshield, dashboard and windows, at the driver's seat, etc. Additionally, two microphones were placed in the cabin: one near the driver's head and the other one in the seating area.

All measurement data was recorded using m+p international's new m+p VibMobile measurement front-end. With its compact form factor, robust design, embedded CPU and storage media it is tailored for portable or standalone operation. m+p VibMobile can be battery operated for applications where no power supply is available. The silent, temperature-controlled



fans make the front-end ideally suited for acoustic measurements. Functions include TEDS support for fast and secure setup, IEPE sensor conditioning switchable for every input channel, cable break and overload detection.

To correlate the recorded signal with the driving situation, for example engine speed, the CANbus interface of the m+p VibMobile is used to read the data from the motorhome's CANbus. The GPS receiver allows position tracking during test drives to investigate the influence of the actual road surface.

Online processing of the data measured in the motorhome was performed using the m+p Analyzer. This noise and vibration analysis software allows the operator



TOP: Recording of structural vibrations and sound pressure on cobblestone

ABOVE: The m+p VibMobile can be mounted in a shock-isolated box to ensure durability in harsh conditions

BELOW: Online data processing in vehicle during the motorhome study



to visualize and check time data, octave spectra, FFT-based spectra, RPM and much more online during the test run. The raw data and results are stored on a removable disk for later post-processing. At the end of the program, testers created a detailed report comparing the vibration profiles of the motorhome recorded on different tracks.

For very high shock and vibration exposure during test runs in vehicles, the m+p VibMobile front-end can be mounted into a shock-isolated three-quarter 19in steel box. This ensures reliable data acquisition in harsh environments. With its front and rear lids, the box becomes vapor-tight and is thus perfect for safe transportation to the site of operation. ◀