

What does the future of automobiles look like?

MEMOSIK[®] – Active Hardware Dummy for the Testing of Dynamic Seating Comfort





Evaluation & Assessment

- Standard evaluation via graphical user interface enabling fast and simple online assessment of measurement data and testing quality in time and frequency domain
- Typical result values:
 - Acceleration at seat rail and cushion
 - Seat-transfer-function (magnitude, phase and coherence)
 - Dummy-transfer-function and quality check of dynamic mass realization
- Additionally, CASIMIR/Post can be applied for objective assessment methods as ISO 2631 or Seat-Value



Variation of Percentile: Configuration is easy

- Variation of passive setup by change of top mass
- Adaption of active setup regarding human behaviour and road profile via GUI



Typical Test Result

Electronic Unit, GUI



Dynamic seating comfort

Dynamic seating comfort in passenger cars begins with the first test drive and therefore is an important selling point. Due to the strong competition within the automotive industry and due to increased customer requirements regarding the driving experience its impact within the seat development is getting more and more significant. An enhancement to subjective ratings is the application of hardware dummies enabling reproducible testing with objective assessment criteria.

Applying hardware dummies ...

- ... for the seat development shows the advantages, that
- the test execution is simple and fast,
- the assessment is based on objective criteria and
- the results are based on the dummy behaviour and the testing procedure and therefore are reproducible,

leading to reduced time and cost expenditure. In addition, testing is easier to schedule as participation

Hardware Dummy MEMOSIK for the Testing of Dynamic Seating Comfort

• The hardware dummy MEMOSIK is designed for the analysis of vertical seat vibrations on the cushion surface and represents the occupant's dynamic behaviour.





- By applying MEMOSIK an assessment between different seat or car set-ups is possible based on objective criteria such as the seat-transfer-function.
- The dynamic behaviour is a combination of passive and active properties adapted by a digital feedback control.
- The behaviour of the human body is implemented by the dynamic mass. Through setup adaption the bandwidth of customers can be represented by three main percentile configurations: f05, m50 and m95. In addition, individual set-ups following OEM specifications can be provided.

Nonlinearities due to typical road profiles are considered by three excitation classes:

- 0.3 m/s² limited noise, low power density
- 0.7 m/s² vehicle noise, medium power density
- 1.4 m/s² vehicle noise, high power density

Typical application scenarios of MEMOSIK within seat development are:

- Evaluation of exposition levels for optimization of design variants regarding dynamic seating comfort
- Comparison of seat set-ups with respect to objective criteria as seat-transfer-function or absolute exposition for occupants
- Benchmark between different car or seat set-ups by test bench or test drive measurements



Replacing the Test Driver: Dummy validation for different seats





Vibration unit in main percentile configurations

Main Components of the System

- Active mechanical vibration unit including all sensors and the actuator
- Electronic unit including power supply, data acquisition and real-time controller
- Notebook with Ethernet-interface to electronic unit for control and analysis, preinstalled software with graphical user interface (GUI)
- Application is possible on test bench and for test drive (12 VDC).

What moves Wölfel?

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Are vibrations really everywhere? Yes! That's why we need a wide variety of solutions! Whether it is engineering services, products or software – there is a specific Wölfel solution to every vibration or noise problem, for example

- simulation-based seismic design of plants and power stations
- measurement of acoustic emissions of wind turbines
- universal measuring systems for sound and vibrations
- expert reports on noise immission control and air pollution forecasts
- dynamic occupant simulations for the automotive and aviation industry
- and many other industry-specific Wölfel solutions ...

MEMOSIK[®] represents the active vibration dummy developed by Wölfel for the evaluation of vibration comfort of vehicle seats – on test benches as well as in cars during the ride.



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