HEAD acoustics



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HEAD acoustics

Setting the global benchmark

Binaural recording and playback technologies are the root and basis for HEAD acoustics' continued success.

Over the years, we have added helpful analyses and measurement devices to our portfolio to better support our customers' development work. Binaural sound recording and its evaluation by analyses and listening tests represent the end of the toolchain. Getting there requires a multi-faceted approach, including assessing and analyzing, for example, forces, structural vibration, transfer behavior, and airborne sound radiation. These steps are essential to optimize your product during the development process efficiently. Our customers appreciate us for the broad and modular HEAD acoustics portfolio and especially for the intuitive operating concept of our software. Digitalization and artificial intelligence open abundant possibilities to support our customers on their way, which we are working on with enthusiasm. Already today, our tools offer:

- Efficient test planning, execution of measurements, and structural dynamic analyses involving CAD models
- Direct comparison of vibration shapes determined experimentally or with simulations
- Hybrid Transfer Path Analysis (TPA) models combine experiment and simulation thanks to Blocked Forces source description
- Evaluation of your experimental or simulation results using listening tests or automated metrics
- Interactive experience and evaluation of test and simulation data with the NVH Simulator PreSense

Always aHEAD

Digitalization offers exciting opportunities and challenges; therefore, HEAD acoustics participates in national and international research projects and keeps incorporating innovative ideas and visions into its products and services. Our international customers, which include leading automobile, industrial, and aerospace manufacturers, benefit from these technologies and our expertise and greatly appreciate the competitive advantages that product sound optimization gives them.

HEAD acoustics, with its know-how and modular and comprehensive state-of-the-art product portfolio, is your strong partner for the successful digitalization of the product development process.

Data Acquisition

HEADlab II

Modular and mobile multi-physics data acquisition



Next-generation multi-channel performance

The second HEADlab generation offers higher sampling rates, more channels, an ultra-compact 24-channel input module, independent HEADlab systems synchronized via GPS or PTP (Precision Time Protocol), standalone recording, and more.

Thanks to its modular design, you can set up the new generation of HEADlab in any way, combining individual modules into customized solutions for the most extensive measurement tasks. The heart of the HEADlab II system is the powerful controller labCTRL II.1. With its new interface protocol, HEADlink 2.0, it enables sample rates from 8 to 204.8 kHz per channel. labCTRL II.1 bundles and synchronizes data, supplies power to connected modules, and establishes the connection to a PC. Connecting multiple controllers allows expanding systems to more than 1000 channels.

Its straightforward, rugged design and flexibly combined and noise-free modules make HEADlab II even more suitable for challenging mobile applications than its predecessor. An integrated locking mechanism allows the modules to form securely dovetailed units that can be easily disconnected after use. All modules of the HEADlab generations I and II are fully compatible.

labCOMPACT is a compact and simplified HEADlab system that combines a controller's essential functions with a multi-channel module. The "single module" technology is a flexible and affordable solution for multi-channel analysis, particularly in developing household appliances and office equipment. You can easily extend labCOMPACT with an additional HEADlab module, and its direct connection to a laptop or PC via USB or LAN ensures a secure and stable data transfer.

HEADlab systems are versatile and easy to configure to match your application.



Users choose which modules to combine with a controller.



Accessories for safe operation



Data Acquisition

A selection of HEADlab Modules



labCTRL II.1

LAN/USB controller for data bundling and synchronization of HEADlab systems. labCTRL II.1 features pulse inputs, CAN-FD, GPS, PTP synchronization, fanless and noise-free operation, and allows stand-alone operation with power boxes.



labV24 II / labV12 II / labVF6 II

Second-generation voltage/ICP® input modules with 24, 12, or 6 channels for measurement setups of different sizes. HEADlink 2.0 supports sampling rates of up to 204.8 kHz per channel in suitable system configurations. labVF6 II additionally provides switchable analog low-pass and high-pass filters, while labV12 II and labV24 II are optimized for applications requiring larger channel counts.



labV8x3-Iso II / labVF6-Iso II / labV12-O4 II

Specialized second-generation HEADlab modules for demanding measurement and structural-dynamics applications. labV8x3-Iso II provides 24 inputs arranged as eight electrically isolated triaxial channels. labVF6-Iso II offers six isolated, high-impedance voltage/ICP® inputs. labV12-O4 II combines twelve acquisition channels with four output channels for shaker excitation. All three modules support HEADlink 2.0 and sampling rates of up to 204.8 kHz, depending on the configuration.



labCF6

6-channel charge/ICP® input module with integrated charge amplifiers, allowing each channel to be configured individually for charge or ICP® sensors. Flexible measurement ranges, switchable filters, and 0 Hz ICP/DC coupling enable precise acquisition of signals down to extremely low frequencies.



labT6

labT6 is a 6-channel input module for connecting up to six thermal elements of types K and RTD (PT100 and PT1000). Each channel features a characteristic curve correction including cold-junction compensation (CJC). The device offers automatic thermal element breakage/cable breakage detection.



labM6 II

6-channel voltage/microphone input module of the 2nd HEADlab generation with HD wide-range input (High Dynamics)



labV6HD

6-channel line/ICP® module. All channels can be used as high-dynamic wide-range input or conventionally with fixed measuring ranges from 10 mV to 30 V.



labSG6

Flexible 6-channel input module for connecting resistive measuring bridges (full, half, and quarter bridges) and for sensors with balanced or unbalanced outputs and uni- or bipolar power supply.



labCOMPACT24 II / labCOMPACT12 II

Compact measurement systems combining the essential functions of a second-generation HEADlab controller with 24 or 12 voltage/ICP® input channels. When all analog inputs are used, sampling rates of up to 51.2 kHz are available; with fewer active channels, rates of up to 204.8 kHz can be achieved. Both systems feature selectable coupling and high-pass filtering, 32-bit signal processing, high phase accuracy, and a signal-to-noise ratio of up to 109 dB(A).



labPWR I.1 / labPWR I.2 / labPWR I.3

Power boxes for the uninterruptible power supply of HEADlab systems, available for different system configurations with power requirements of up to 100 W. Integrated rechargeable batteries enable continued operation without an external power source, while seamless power switching, robust design, and fanless operation make the modules suitable for both mobile and stationary applications.

Mobile Data Acquisition

SQuadriga III

KEY FEATURES

- Small and easily portable
- Binaural recording and playback with binaural BHS II headset
- Stand-alone operation with real-time analysis
- Sound pressure level, loudness, and sharpness measurement
- Several hours of autonomous measurements on battery power
- Integrated GPS for recording location, time, and routes
- Pulse input and CAN FD support for vehicle data
- Functions for Impact Testing and Sound Intensity Measurment available
- Option packages for customizing the functional scope of the firmware

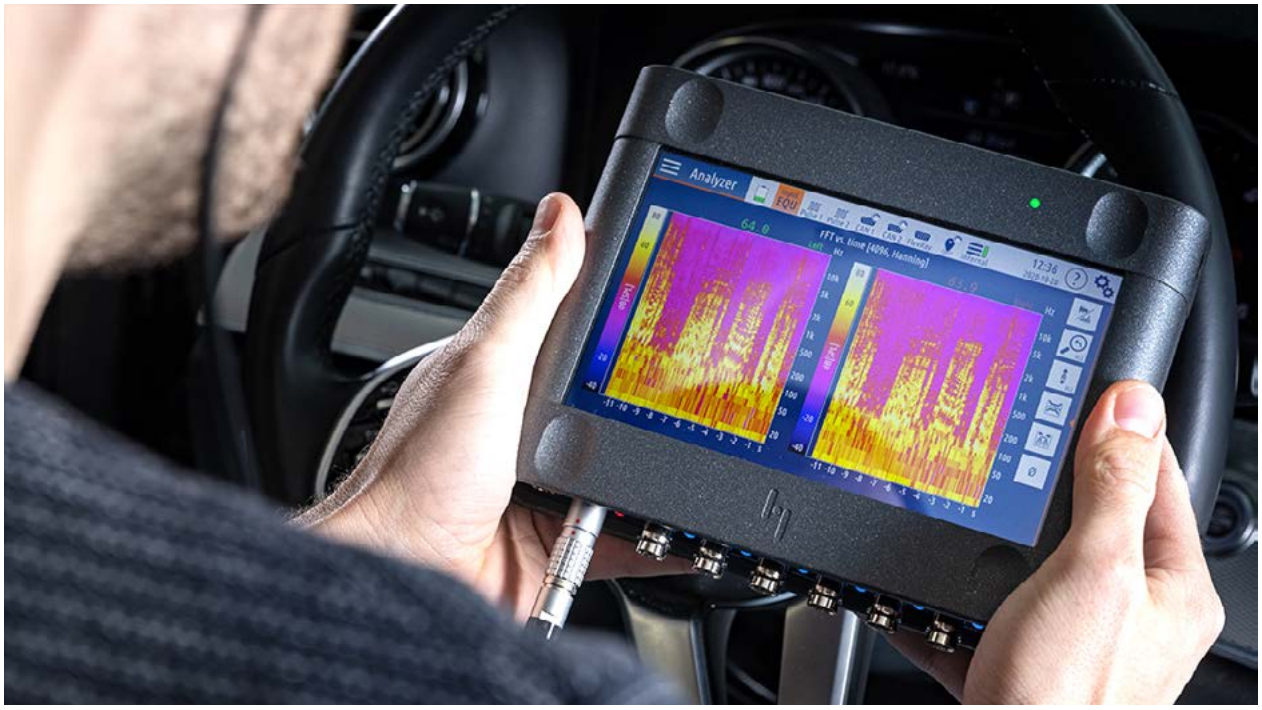


Direct sound intensity calculation with the optional Advanced Online Analysis firmware package

The industry standard for mobile data acquisition, playback, and analysis

The overwhelming success of SQuadriga is due to its compact design and high level of functionality in stand-alone mode. Engineers tasked with finding and fixing problems need only carry a SQuadriga III and the necessary transducers into the field – a computer is not necessary.

The hand-held system SQuadriga III has eight analog channels, various digital inputs, a built-in display, a GPS receiver, a battery, and memory. It is ideal for mobile sound and vibration measurements in any industrial application. Thanks to the many integrated interfaces and functionalities, adapters are unnecessary. With the BHS II headset, you can use binaural recording and playback technology anywhere. Combine SQuadriga III with other modules and increase the number of channels or extend the analysis capability with firmware packages. It performs conventional analyses (FFT, octave bands) and calculates and visualizes psychoacoustic analyses, sound intensity, transfer functions, coherence, etc.



Mobile Data Acquisition

SQobold



Measure everywhere



Portable and compact stand-alone sound and vibration measurement and integrated analysis

KEY FEATURES

- Extremely compact binaural recording and playback system
- Four-channel data acquisition system
- Sound pressure level measurement and psychoacoustics
- Long battery life (up to six hours)
- High-quality color display with capacitive touchscreen
- Large storage capacity (64 GB of internal storage)
- Real-time filtering
- Video and GPS function
- ICP®, AC and DC couplings can be switched independently

SQobold is a compact, versatile, and portable data acquisition system with four analog channels, a built-in display, battery, memory, and GPS receiver for state-of-the-art sound and vibration measurement.

SQobold supports CAN FD/OBD-II to help with automotive characteristics such as speed, engine RPM, etc. Yet SQobold can do much more than that: The versatile stand-alone system is a reliable sound level meter that can visualize physical and psychoacoustic variables. Psychoacoustic aspects are becoming even more critical as criteria for evaluating noise in directives and regulations. With SQobold, it is possible to monitor conventional sound pressure levels as accurately and efficiently as the psychoacoustic phenomena of loudness and sharpness in line with the DIN 45631/A1 and 45692 standards. With a battery life of up to six hours, a compact size of 14.3 cm, and a weight of just 490 g, SQobold can be used anywhere.

The acquired signals' spectral distribution can be displayed in the field with online FFT analysis. Level over time, one-third octave and other FFT-based analyses are possible. Moreover, psychoacoustic measurements can be conducted, such as loudness over time, sharpness over time, and specific loudness.

With SQobold, it is possible to experience the sound and the visuals of a recording. The measurement process can also be documented with videos or photos. The integrated GPS receiver stores the exact time of each measurement, as well as the location.

Binaural Recording

HSU

Record sounds true to reality

With binaural recording systems, you can record sounds true to reality. Our artificial heads accurately capture all acoustically relevant events. Ear simulators with different microphones enable aurally accurate recordings.

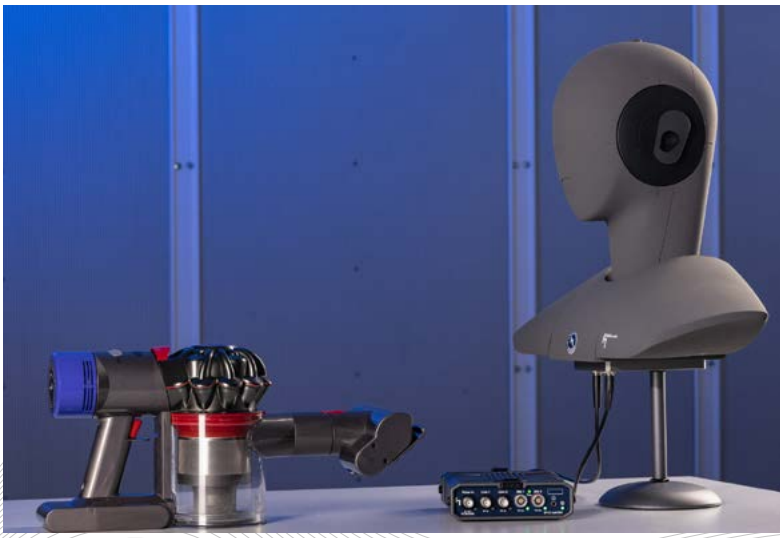


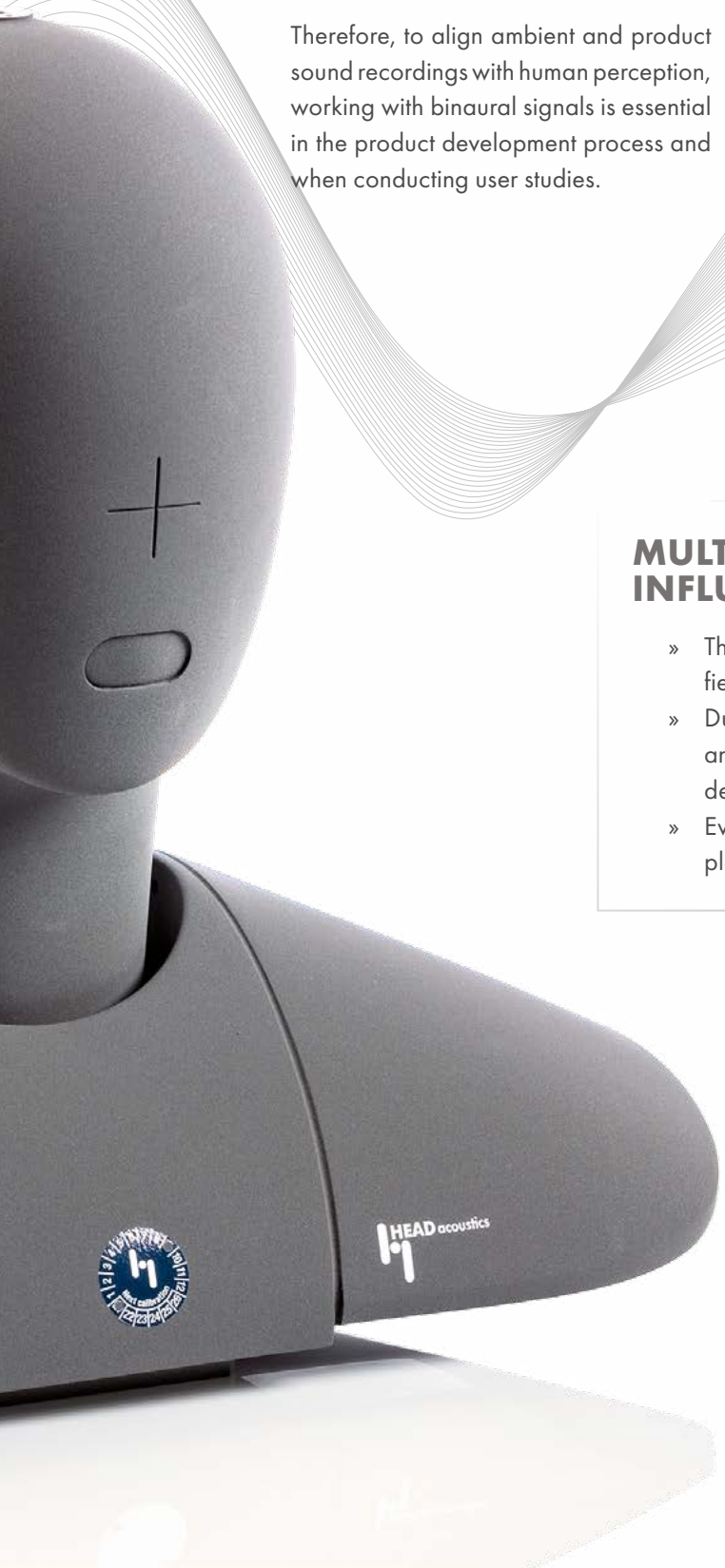
The analog HSU (HEAD Shoulder Unit) artificial head microphone series is the perfect solution for creating reproducible binaural recordings

Reality is always binaural

Humans usually hear binaurally, i.e., with both their ears. Based on these two ear signals, the brain evaluates the sound.

Therefore, to align ambient and product sound recordings with human perception, working with binaural signals is essential in the product development process and when conducting user studies.





MULTIPLE FACTORS INFLUENCING THE SOUND

- The listener's body changes the sound field.
- Due to the influence of shoulders, head, and ears, the ear signals are direction-dependent and differ.
- Every device in the measurement and playback chain impacts the signal.

Only if these influences are considered in the binaural recording can listeners genuinely perceive it as if they were present in the original sound field, including directional hearing and the differentiation and separation of sound sources.

Binaural Recording

BMK

Capture what motorcycle riders actually hear.



The Binaural Microphone Kit BMK enables aurally accurate and reproducible sound recordings during motorcycle test rides. Two compact microphones are securely integrated into a motorcycle helmet and positioned close to the rider's ears. This fixed microphone arrangement captures the sound exactly where it is perceived while avoiding the handling and comfort limitations of conventional in-ear microphone solutions.



The unobtrusive installation allows the rider to concentrate fully on the test ride while engineers obtain consistent measurement data under real operating conditions. When combined with SQuadriga III, SQobold, or an ICP-capable HEADlab system, BMK provides an efficient solution for evaluating wind noise, helmet acoustics, rider comfort, and the overall sound quality of motorcycles.

KEY FEATURES

- Aurally accurate binaural recordings during motorcycle rides
- Two microphones positioned directly beside the rider's ears
- Fixed microphone positions for consistent and reproducible results
- Comfortable, compact, and unobtrusive installation
- Realistic measurements under actual riding conditions
- Compatible with SQuadriga III, SQobold, and HEADlab
- Suitable for wind-noise, sound-quality, and rider-comfort evaluation
- Aurally accurate on-site playback of recorded sounds using a binaural playback device

Digital Artificial Head

HMS V



The HMS V digital artificial head combines cutting-edge technology, high flexibility, and ease of use. With its Dual ADC technology (two parallel analog-to-digital converters), the HMS V covers the entire audible dynamic range, rendering measuring range changes obsolete. With the HMS V, you perform binaural equalization immediately during the measurement, and its headphone jack enables playback or monitoring during measurement using HEAD acoustics headphones.

HMS V offers a broad range of interfaces

The HMS V integrates seamlessly into HEADlab systems as a binaural sensor. It constitutes a comprehensive measurement system combined with other artificial heads or linked to other devices, such as the HEAD VISOR (acoustic camera) or the SQuadriga III (mobile frontend). A PC with the ArtemiS SUITE Recorder software connected via USB or LAN takes over control in frontend mode. Integrating an additional HEADlab module allows you to adapt the system flexibly to specific measurement tasks.

KEY FEATURES

- Digital measurement system for aurally correct recording and accurately equalized playback
- High-end audio quality with high dynamic range
- With Dual ADC technology no switching of measuring ranges is necessary
- Versatile applications due to many interfaces, extensions, and operating modes
- Stand-alone recordings with internal memory and battery power supply



HMS V even offers convenient stand-alone recordings (SAR) with internal memory for the signal data and a high-capacity battery. You can increase the autonomous runtime with a labPWR battery module and USB memory. During SAR, you configure and control HMS V using an intuitive web interface on a smartphone, tablet, or PC connected wirelessly or via cable.

Digital Binaural Headset

SQope

SQope, combined with the HEAD B2U app, is the easiest way to make, save, and play back mobile binaural recordings.



Handy and comfortable binaural headset

After installing the HEAD B2U app (free via the Apple App Store), connect SQope to your mobile device via USB, start the app, and record immediately. The USB connection powers SQope, so you are entirely autonomous and can move around freely. Your recordings are saved on the mobile device and can be played back via SQope or transferred to a computer for later analysis with ArtemiS SUITE.



SQope is also a perfect partner for the ArtemiS SUITE APR 100 Compact Analysis Module, which allows you to examine a recorded measurement with just a few clicks.

SQope correctly equalizes recordings and playbacks fully independent of a mobile device or computer. The necessary equalization filters are already installed, so you can record and play back correctly equalized right from the start.

Thanks to its low weight and ease of use, SQope is suitable for a wide range of applications.

Acoustic Camera



HEAD VISOR VMA V

Flexible, large-format microphone array

The portable, hand-held acoustic camera HEAD VISOR VMA V offers unprecedented ease of use and uncomplicated, versatile handling. By integrating a battery, a touch display, and all essential operating buttons, it redefines flexibility and usability. All relevant inputs and outputs are already integrated into the light and compact HEAD VISOR VMA V.

The MEMS microphones provide a high dynamic range and high resolution. Thanks to its modular concepts, you can use it without or with the array arms, choosing between a 30-cm (60 microphones) and a 100-cm (120 microphones) diameter – more than twice the amount of our previous generation.

Unlike smaller stand-alone devices, HEAD VISOR VMA V yields highly accurate results, making it the first choice for professional users.

HEAD VISOR PROBE

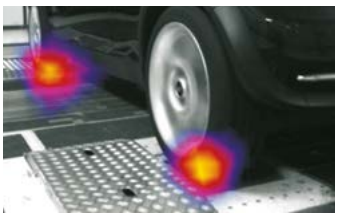
Hunting for low-frequency noise

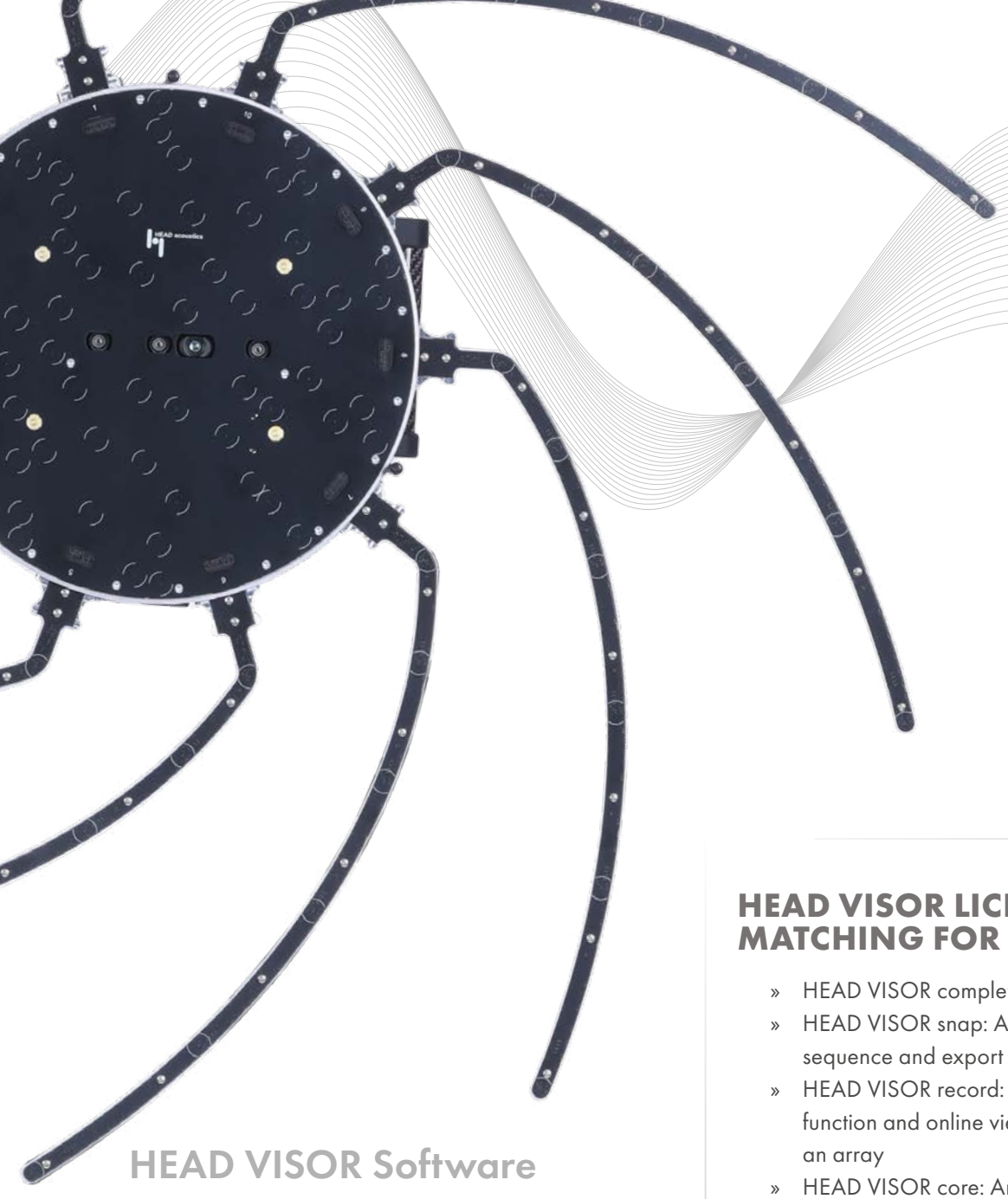
To effectively reduce the low-frequency noise components often generated and emitted by machines, it is essential to identify the exact source of the sound events. The HEAD VISOR PROBE, which can now be connected directly with the HEAD VISOR VMA V, supports you in localizing the sources of airborne sound.

Beamforming results









HEAD VISOR Software

Beamforming, recording, evaluation, and presentation of the highest-quality acoustic measurements

The intuitive HEAD VISOR software immediately displays the complete results of all functions of the HEAD VISOR VMA V microphone arrays and the HEAD VISOR PROBE without delay, significantly speeding up your work.

All measurement data are saved as raw files, allowing you to retroactively apply any settings – such as distance measurements, frequency ranges, and algorithms – at any time. Highly sophisticated additional algorithms provide further insight into the acoustics of complex measurement objects. Emitted sounds can be differentiated by location, frequency, order, or sound components and sorted by signal levels. The obtained detailed results can be compiled and documented into a single overall image with a dynamic range of up to 40 dB (HDR function). The system can automatically start and stop measurements using sophisticated trigger functions and sort the results accordingly.

The built-in screen recorder "films" the entire user interface during your evaluation. All results are thus directly converted into an audiovisual movie that you can include in the presentation of your results. Creating impressive presentations has never been so quick and easy.

HEAD VISOR LICENSES – MATCHING FOR ANY NEED

- » HEAD VISOR complete: Full license
- » HEAD VISOR snap: Analyze a fleeting sequence and export an image or movie
- » HEAD VISOR record: Only recording function and online view, always requires an array
- » HEAD VISOR core: Analysis license without array, project view, and export functions

Sound & Vibration Analysis

ArtemiS SUITE

ArtemiS SUITE is an integrated software solution allowing you to perform virtually any sound and vibration analysis task. Enjoy the efficient and natural workflow within ArtemiS SUITE, where all applications interact seamlessly.



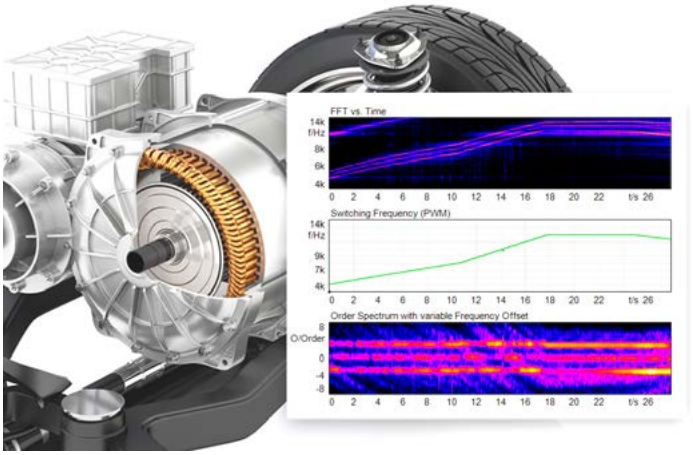
ArtemiS SUITE is leading in usability, performance, scope of operability, and connectivity.

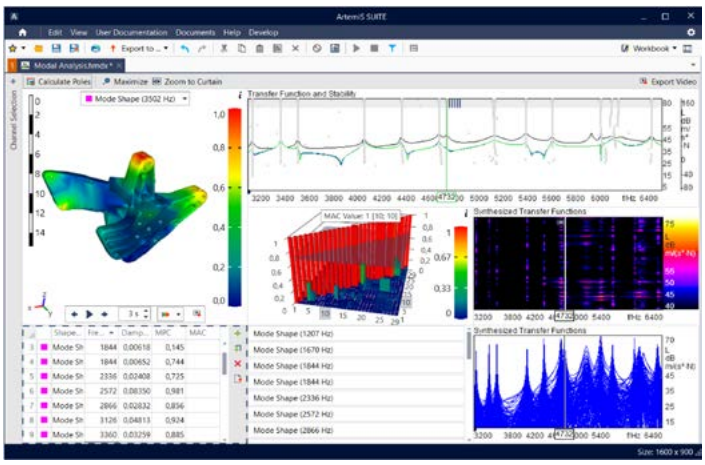
ArtemiS SUITE is the universal software solution for your sound and vibration analysis.

ArtemiS SUITE combines all the tools needed to perform comprehensive measurements and in-depth analyses. It provides functions for data management, report generation, and automation, all within a single, consistent software environment.

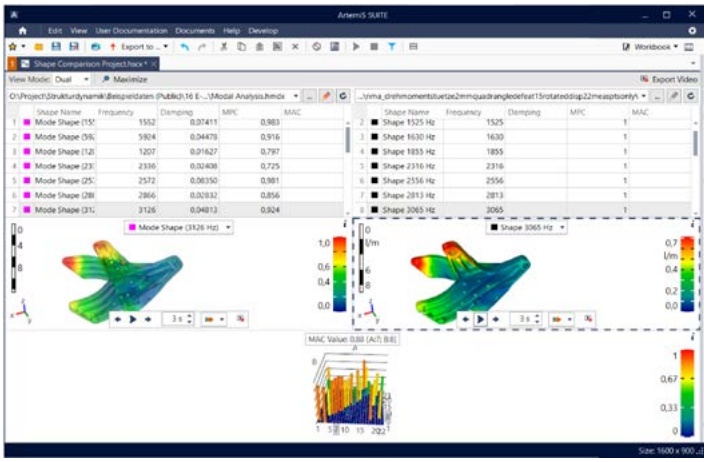
ArtemiS SUITE also simplifies structural analysis. Its clearly defined, fully integrated structural dynamics tools complement the software's proven capabilities. The tools enable users to efficiently analyze time-domain animations, modal shapes, and operational deflection shapes.

The software supports importing various types of CAE data in a wide range of file formats, including 3D geometries from CAD systems and FE result files. These data can serve as a basis for measurement planning and for animating the identified vibration modes and patterns. The shape comparison module provides an intuitive tool for validating simulation results against measurement data. It can also be used to evaluate component modifications by comparing synchronized animations of different variants.





Use a CAD model to visualize its mode shapes



Comparing EMA with numerical modal analysis

Structural Analysis

APR 4xx

Structural Dynamics Modules – a Complete System for Structural Analysis

The design and dimensioning of machine components strongly influence the vibration and acoustic behavior of the complete machine. Targeted development therefore requires reliable identification of the natural frequencies and mode shapes of relevant structures.

ArtemiS SUITE and the APR 4xx Structural Dynamics modules provide a complete system for structural analysis. All that is needed is a laptop, a recording frontend such as HEADlab, SQuadriga III, or SQobold, an accelerometer, and an impact hammer.

AI-Supported Measurement Preparation

The AI-supported Reference+ algorithm determines the optimal reference points for impact and shaker measurements by identifying points that capture all relevant modes.

The Measurement Point Library forms the basis of structural analysis and TPA applications. It contains a 3D or wireframe model with all measurement points, enables mode-shape animation, and reduces acquisition errors such as incorrect sensor-axis assignment.

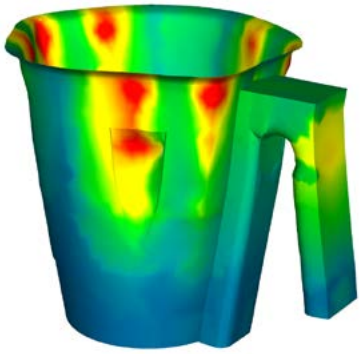
Guided Measurement, Evaluation, and Model Validation

For impact measurements, an intuitive workflow guides users from setup to completed analysis. Parameters including sampling rate, block size, and windowing can be configured automatically for the test object and hammer tip, while manual adjustment remains possible. During acquisition, the software indicates the next impact point and checks measurement quality. Double hits, overloads, and results with low coherence are rejected automatically; valid impacts are averaged and stored in a documented HDF file.

The data can be reviewed in the Data Viewer and included in an automatically generated report. AI-enhanced methods support the extraction of resonance frequencies and modal damping values. The Shape Comparison Project enables simulation-model validation using the Modal Assurance Criterion (MAC), with direct import of numerical results from NASTRAN, Ansys, or Abaqus. ArtemiS SUITE Extension ASX 10 integrates the system into automated model-updating workflows.



Modal amplitudes on a complete CAD model



Modal amplitudes with motion and colors



Wireframe representation to look through objects and see the backsides

KEY FEATURES

- Complete measurement and analysis system
- AI-supported reference-point selection and modal parameter extraction
- Measurement Point Library for 3D visualization and measurement setup configuration
- Guided impact measurements with automatic setup and quality control, and documented storage
- FE validation, including model updating workflow integration

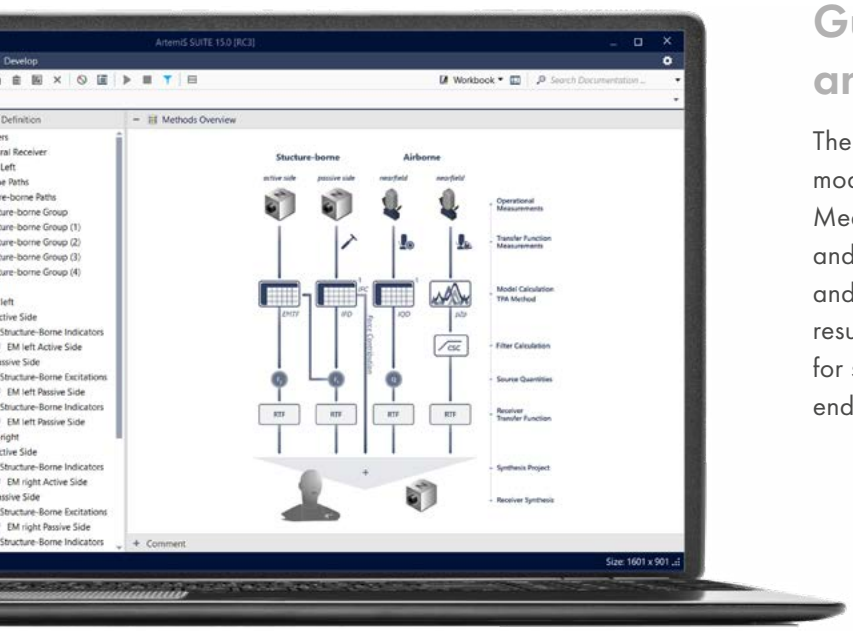


Transfer Path Analysis

ArtemiS TPA Project

Build a transfer path model and calculate source characteristics and path contributions in the time domain.

Easy transfer functions recording, transfer path analysis, and input data set creation

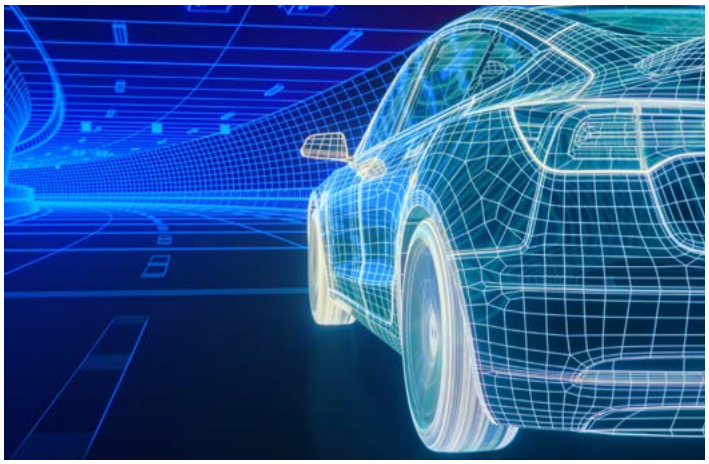


The ArtemiS TPA Project supports transfer path analysis and the creation of data sets for PreSense and Prognoise. Using transfer functions and operational measurements, it calculates the contribution of each transmission path and creates a model of airborne and structure-borne noise and vibration.

Guided Model Setup and Data Acquisition

The software guides users step by step through model creation and measurement. The Measurement Point Library, optional 3D model, and clear model tree make it easy to build and manage even complex TPA models. The resulting model also provides a consistent basis for structural analysis and supports an efficient end-to-end workflow.





Transfer functions can be measured with the TPA Data Acquisition Project, which uses the existing TPA model to configure the measurement setup while allowing detailed, individual settings. ArtemiS SUITE Recorder is integrated seamlessly into the process. Alternatively, the Impact Measurement module guides users through hammer measurements and supports both beginners and experienced users. In both cases, the Measurement Point Library and 3D model help users complete all required steps quickly and reliably.

Hybrid Analysis and Interactive Model Modification

For hybrid approaches combining measurement and CAE data, models can be exported to Prognoise. There, users can investigate "what-if" scenarios and directly auralize changes to excitations, transfer functions, and other model parameters. Prognoise also supports operational transfer path analysis (OTPA), allowing source contributions to be separated algorithmically without additional transfer-function measurements.

Connecting Simulation and Measurement with VPT

Virtual Point Transformation (VPT) combines forces, moments, accelerations, and angular accelerations at a defined virtual point. This simplifies communication between departments or companies and creates a consistent interface between simulated CAE data and measured results.

KEY FEATURES

- Binaural TPA in the time domain (for structure-borne & airborne)
- Blocked Forces (using in-situ and classical methods)
- Component-based TPA
- Virtual Point Transformation (VPT)
- Calculation via matrix inversion
- Effective mount transfer functions
- Model validation VPT, ICC+ and synthesis

Playback

playSeries

Calibrated binaural playback for NVH evaluation



In NVH development, acoustic differences must not only be measured but also experienced. The playSeries provides aurally accurate and level-correct reproduction of binaural recordings, analysis results, and auralized sound variants. It enables engineers, project teams, and decision-makers to evaluate product sounds under consistent and reproducible listening conditions.

playBasic is the compact solution for individual listening at the workplace, during meetings, or directly beside the test object. playPro allows two listeners to compare the same NVH recording or sound variant simultaneously using two independently equalized headphone outputs. playStudio provides reference-grade playback for listening studios, jury testing, interactive NVH simulation, and research applications.

Together with matched HEAD acoustics headphones, the playSeries supports the complete NVH workflow—from the evaluation of measurements and TPA results to the comparison of simulated components, sound-design alternatives, and virtual prototypes.



KEY FEATURES

- Aurally accurate and level-correct binaural playback
- Reliable comparison of measured, simulated, and modified product sounds
- Reproducible listening conditions across development teams
- Scalable solutions for mobile use, workplaces, listening studios, and simulators
- One or two independently equalized headphone outputs, depending on the model
- Reference playback for jury testing and interactive NVH simulation
- Integration into HEAD acoustics analysis, evaluation, and simulation workflows
- Matched playback systems and headphones for consistent sound-quality assessment

Jury Testing

SQala

With SQala, you can quickly and easily set up jury tests and perform them in a single-user system or a listening studio. SQala supports playback of binaural recordings and enables product or ambient noises to be rated flexibly and aurally accurately no matter where or when.



Once created, a SQala Project can be used for various jury testing scenarios and types



Clear, solution-oriented and intuitive user interface

Possible modifications to product noise can then be carried out seamlessly in ArtemiS SUITE and tested again in SQala before being implemented in actual prototypes.

The test coordinator can use interactive tools to supervise, manage, and control jury testing. The results are stored on the SQala Server. A seamless connection to the ArtemiS SUITE software platform offers a wide range of noise pre- and post-processing functions.

SQALA OFFERS COMPREHENSIVE JURY TESTING METHODS, FOR EXAMPLE:

- Category judgment
- Simultaneous category judgment
- Ranking with category
- Paired comparison
- Semantic differential

Interactive NVH Simulator

PreSense

Virtual engineering & prototyping

Replace expensive prototypes with virtual test drives and increase development speed: PreSense, our interactive NVH simulator, allows users to experience vehicle acoustics even before individual components and assemblies are physically available. Integrating measurement data, simulation data and results from binaural transfer path analysis, PreSense creates an interactive workspace for NVH vehicle simulation.

Using PreSense, the driver may act and behave as if driving an actual vehicle, while a driving model calculates vehicle speed, engine speed(s), and load(s).

The NVH simulator auralizes corresponding noise contributions, e.g., from powertrain, tire/road, and wind, in real time.

During the simulation, users can virtually replace, add, or modify powertrains, components, and other sound sources. Changes are immediately audible and enable the driver of the virtual vehicle to undertake a valid acoustic assessment without in-depth specialist knowledge. The possibility to experience sound and vibrations supports quick and safeguarded decisions.

Further applications include the virtual evaluation of Advanced Driver Assistance Systems (ADAS) and Active Sound Design (ASD) components, with PreSense used as an interactive sound design studio.

Calibrated playback can be provided via headphones, loudspeakers, and shakers. In combination with HXB PreSense and SoundSeat, PreSense reproduces sound and vibration as an immersive, multimodal driving experience.

PreSense – Interactive NVH simulator for virtual engineering & prototyping





KEY FEATURES

- Interactive vehicle interior sound simulation in real time
- Realistic reproduction of powertrain, tire/road, and wind noise
- Simulation of warning sounds, traffic events, and reverberation
- Integration via gRPC, CAN FD, or IPG CarMaker®
- Suitable for conventional, electric, and hybrid vehicles
- Applications in driving dynamics, ADAS, HMI, and sound design
- Calibrated playback via headphones, loudspeakers, and shakers
- Multimodal sound and vibration reproduction with SoundSeat



Active Sound Design

Interactive NVH Simulator

From desktop application to full-fledged simulators

PreSense is a scalable solution for different simulator configurations and levels of immersion. Interfaces to third-party software solutions allow easy and flexible integration into existing driving simulator environments.

Desktop simulator

The desktop simulator offers calibrated and aurally accurate sound reproduction via headphones.

User interaction via steering wheel and pedals together with immersive visualization allow realistic simulation of the driving scenario.



SoundSeat

Combined with the HEAD acoustics SoundSeat, the NVH simulator can be operated like an actual vehicle. The user accelerates, brakes, and changes gears while the system adapts sounds and vibrations to the driving situation in real time.



SoundCar

Integrated into an adapted vehicle, the NVH simulator facilitates playback in a natural vehicle environment. Both the acoustic and technical vibration-specific aspects of sound perception are considered. The system reproduces sound scenarios recorded in the vehicle by simultaneously generating airborne sound and vibration stimuli, e.g., from the steering column and the driver's seat.



Complete vehicle simulator

PreSense can be integrated as a subsystem in full-fledged vehicle simulators. To correspondingly adapt sounds in the NVH simulation software, simulator's driving model transmits operating state variables such as engine speed, vehicle speed, and load via provided software interfaces.


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Mobile NVH simulator

As a mobile version with ANC headphones, the NVH simulator can be used in a vehicle without costly conversion measures. Virtual vehicle sounds are played back during real driving, while the operating state variables are transmitted via the vehicle CAN bus.



Interactive NVH Simulator

PreSense Drive

Realistic vehicle interior sound for driving simulators

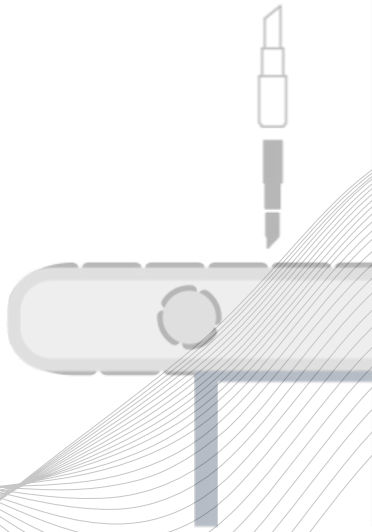
PreSense Drive is an interactive vehicle interior sound simulation solution designed for integration into existing driving simulators. Standardized interfaces allow a straightforward connection to third-party simulators.

Based on the proven technology of the PreSense NVH Simulator, it dynamically reproduces powertrain, tire, road, and wind noise in real time. Additional sounds such as indicators, warning signals, passing vehicles, sirens, or tunnel reverberation can be incorporated into the simulated driving environment.

PreSense Drive responds directly to changing operating parameters, enabling drivers to experience vehicle sound in a realistic context while evaluating driving dynamics, ADAS, autonomous-driving functions, HMI concepts, or Active Sound Design.


SoundSeat

End-of-Line Testing



AQuire V4 & conTEST

Automated vibroacoustic quality control

AQuire V4 and conTEST provide a compact and flexible solution for automated End-of-Line and endurance testing. The system evaluates the acoustic and vibration characteristics of products directly within the production process and reliably identifies deviations from the defined quality requirements.

The compact AQuire V4 frontend acquires signals from up to four microphones, accelerometers, or other analog sensors. Additional interfaces for pulse signals and CAN FD enable the acquisition of operating parameters and reference variables. Measurement data are transferred to conTEST via LAN or USB.

The software conTEST analyzes the acquired data in real time using established signal-processing methods, psychoacoustic analyses, and AI-supported detection metrics. It automatically evaluates the results and provides a reliable OK/NOK decision. Standardized interfaces facilitate integration into existing production lines, test stations, and control systems.



KEY FEATURES

- Automated End-of-Line and endurance testing
- Fast and reliable OK/NOK classification
- AI-supported detection of abnormal sound and vibration phenomena
- Four analog inputs for microphones, accelerometers, and other sensors
- Pulse, CAN FD, LAN, and USB interfaces
- Flexible integration into production lines and test stations
- Extensive acoustic, vibration, and psychoacoustic analyses
- AQuire V4 also usable with ArtemiS SUITE

Engineering Services

Always at your side

In the lab and in the field

In your laboratory, in our laboratory, on the test bench, roads, and test tracks: We perform testing under controlled conditions based on the latest, proven findings and using state-of-the-art technology.

Sharing knowledge

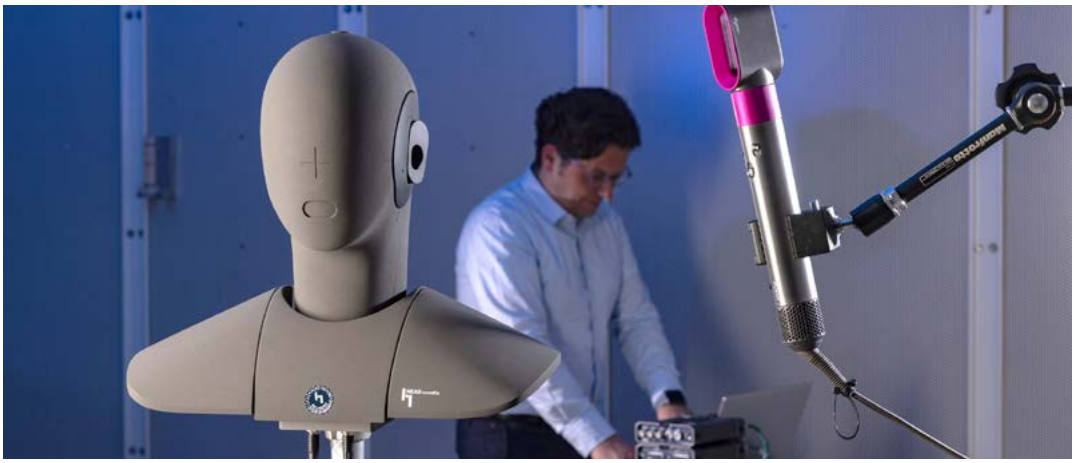
In projects and training, we share our knowledge while working on your specific tasks, resulting in shorter training times and stringent approaches.

Your strong partner. Solution- and resource-oriented

As experts in acoustics, sound and vibration, vehicle NVH, as well as the quality assessment of communication, speech, and audio, we support our customers with their individual requirements and complex projects anywhere around the globe. Benefit from innovative, scientifically-based methods and three decades of experience and expertise. Together, we identify your project goals and implement the resulting requirements successfully. We will find the best solution as an independent partner or in collaboration with your team.

Product sound optimization

Leading binaural technology that focuses not only on raw data but also the human perception.



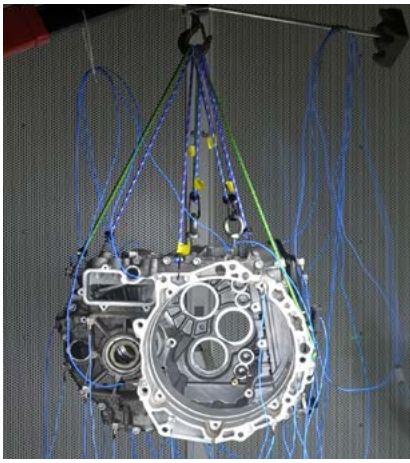


Mobile measurements

With our state-of-the-art mobile data acquisition systems, we perform measurements in any location.

Development support

We support your product development with analyses and customized solutions based on both experimental and numerical methods.



OUR ENGINEERING SERVICES

- Benchmarking
- Transfer Path Analysis: Follow the airborne or structure-borne sound paths
- Structural Analysis
- Simulation
- Auralization of CAE data
- Active Sound Design: Create synthetic sound components to achieve the perfect target sound
- Development of sound quality metrics based on machine learning
- EoL/Quality Monitoring:
  - Prediction of perceived sound quality through machine learning
  - Vibroacoustic classification (e.g., for OK/NOK ratings)
  - Creation of classifiers for end-of-line systems
- ASX as an Engineering Service: Provision of customized system solutions to extend ArtemiS SUITE (e.g., SQala step, Matlab Add-In for ISO standards)

System analysis

A clearly defined, structured approach and scalable measurement and analysis tools enable us to measure and analyze any complex system from hair dryer to complete vehicle.



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