

## HEAD acoustics expands its main office in Herzogenrath

### New annex: Familiar quality in a new shell



Figure 1: New complex of buildings

#### Room for new potential

The demands on the research and development of innovative technologies for NVH are becoming increasingly complex. To meet these demands, we are expanding our main office in Herzogenrath, near Aachen in Germany.

The new complex accommodates modern test benches, sound measuring rooms and offices for new workplaces. Along with a cafeteria

and various seminar rooms, we have new engine and roller test benches, an audio laboratory, an anechoic room and sound measuring rooms. These facilities allow us to continue to offer customers and project partners effective cooperation with innovative approaches. We will keep working to meet these increasing demands in future.



Figure 2: Open House for the new complex

#### Open House

An open house party for the new complex provided us the opportunity to show our customers and partners around the new premises for the first time. At the core of the event were speeches given by experts from science and industry. Smaller side events were held for technical presentations of the measurement facilities and acoustic laboratories by our experienced acoustic engineers. Guests could inspect actual measurement situations in action and were even given the opportunity to test products and applications for themselves.



Figure 3: Vocal artist Isabeella Beumer

A real highlight was the fascinating performance from the vocal artist Isabeella Beumer. The tones that this artist created sounded like something from a different era. The harmonics she produced were quite fascinating, moving between two, three or four octaves at once, achieving frequencies of over 20 kHz and at levels of up to 120 dB.

## Topics

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## Events and News 2009

### Tag der Akustik 2009 (Acoustics Day)

This year is no exception as our traditional autumn workshop "Acoustics Day" is taking place at four locations throughout Germany! Our experienced acoustic engineers will present a key subject in acoustics – with graphic and practical examples.

Find out more soon at [www.head-acoustics.de/tag\\_der\\_akustik](http://www.head-acoustics.de/tag_der_akustik).

**01.09.2009** Maria Laach  
**03.09.2009** Lüneburg  
**22.09.2009** Nürnberg  
**24.09.2009** Ludwigsburg

### NVH User Group Meeting 2009

This year's NVH User Group Meeting is taking place in Southern Germany with the theme "Users profit from Users". Once again we are inviting experts from our business partners to tell us about their particular applica-

tions, innovative methods, and experiences with our products. Please make a note of this event or register with an e-mail to: [sales@head-acoustics.de](mailto:sales@head-acoustics.de)

**19.11.2009** Southern Germany

### Workshop on multi-sensory perception and noise reproduction

HEAD acoustics offers a range of systems for binaural, aurally accurate reproduction of sounds (e.g. interior vehicle noise).

Offerings range from high-quality acoustic reproduction with electrodynamic or electrostatic headphones to highly advanced systems for simultaneous, interactive reproduction of airborne sound and vibrations in the appropriate

driving simulators. The basis for developing these products is the holistic approach, whereby subjective noise judgment must be considered as a multi-dimensional task.

The workshop on multi-sensory perception and noise reproduction gives you an overview of the different methods for the reproduction of noises and vibrations.

Various experimental setups allow participants to experience for themselves why the adequate reproduction of airborne sound and vibrations is so significant.

We look forward to seeing you!

To find out more, visit [www.head-acoustics.de/bedeutung\\_von\\_wiedergabesystemen](http://www.head-acoustics.de/bedeutung_von_wiedergabesystemen).

**Autumn 2009** Herzogenrath

### Honorary professor

At the suggestion of the Faculty for Electrical Engineering, Dr. Klaus Genuit was named an honorary professor by the Technical University of Aachen (RWTH) in the final quarter of 2008. Professor Genuit has been lecturing on "Psychoacoustics" at the Institute for Technical Acoustics at the RWTH Aachen for over ten years.

### HEAD-Genuit-Foundation

The "HEAD-Genuit-Stiftung" (HEAD Genuit Foundation) is a non-profit organization based in Herzogenrath, near Aachen, Germany, founded at the end of 2008 by the founder of HEAD acoustics GmbH, Prof. Dr. Klaus Genuit. The objects of the foundation include the promotion of science and research especially for individuals and organizations active in the area of improving noise

quality, reducing noise pollution, developing methods and procedures for noise measurement and analysis, preferably in the environment and places of work.

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52134 Herzogenrath  
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## Noise quality – an element of product development

### HEAD acoustics inaugurate a new noise laboratory for Engineering Services in Herzogenrath



Figure 4: Four-wheel roller test bench

It has long been the case that a product's functionality alone is no guarantee for its success. An increasingly competitive environment means that success depends on a high level of functionality in combination with top quality and convenience. Consequently, a vital task in designing a product is to assure its acoustic quality.

This is why HEAD acoustics is a provider of engineering services for the acoustic optimization of products. The company recently opened a new laboratory for "Noise, Vibration, Harshness (NVH)" at its location in Herzogenrath. The new building also accommodates two sound-measuring rooms, a three-dimensional anechoic room, a motor test bench, and an audio laboratory. The new facilities and new technologies enable experienced engineers to be even more effective in the identification and optimization of noise and vibrations from vehicles and other devices. The concept of noise identification and

optimization depends on the system for aurally-accurate evaluation. A vital component of this is our four-wheel roller test bench for realistic driving situations in a low-noise environment. A key factor is to coordinate the evaluation of the

results with the practical implementation of improvements. The resulting acoustic solutions must then be integrated into the product's mechanisms and construction.

The newly constructed NVH laboratory with about 900 m<sup>2</sup> of floor space is central to our work in the identification, evaluation and modification of noise. Vehicle platforms from customers all over the world are tested here. The spectrum ranges from small cars to

large off-road vehicles and coaches (trucks, buses). The entire vehicle can be tested for the most diverse set of requirements for on-road use. A specialized lifting platform in the low-noise room allows measurements to be made with and without wheel load.

Equally important is the audio laboratory, where listening tests determine the optimal acoustic image for a product before it goes into manufacture. In this field, intuitive, quick and uncomplicated implementation of listening tests makes it possible to carry out benchmarking, target setting and validation.



Figure 6 : Audio laboratory in Herzogenrath



Figure 5: Evaluation in the audio laboratory

Binaural transfer-path synthesis represents the ultimate in simulation. Whereas current vehicle tests ultimately serve to confirm the optimal sound, these methods of simulation can be used to find practical solutions for noise optimization. The option of auralization allows the results to be played back immediately to a jury or individuals.

## HEAD VISOR – now available as a service

Acoustics problem? Want to learn how modern microphone-array technology can help? Give us a call.

The HEAD VISOR is an innovation in microphone array technology. This system solution is for the localization, visualization, quantification and auralization of sound sources.

**Our laboratories offer you:**

### Provision of the HEAD VISOR system

A complete HEAD VISOR system is set up for you and is made available for an agreed period of time.

### Execution of measurements and analyses

Experience the unmatched advantage of real-time analysis and high resolutions for your on-site tasks.



Figure 8: Deployment in the full-vehicle test bench

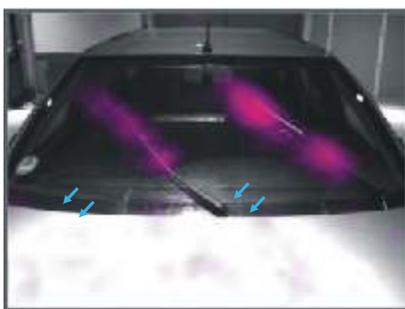
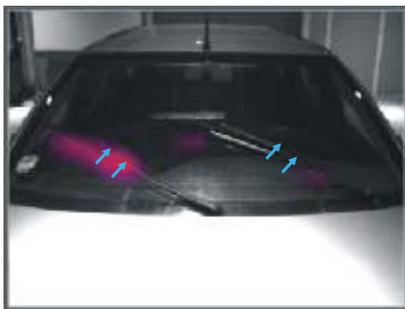


Figure 7: Windshield-wiper noise: Upwards, the left-hand wiper is dominant (figure above), downwards the right-hand wiper is dominant (figure below)

### Analysis and documentation by a HEAD acoustics Engineer

You benefit from the extensive experience of our consulting engineers – they know how to extract the maximum potential from our HEAD VISOR system.

### Visualize acoustic phenomena!

Just minutes after the measurements, you can view detailed images and film sequences for your presentations, that allow “non-acousticians” to understand the problems and necessities of the acoustic changes that need to be made.

Interested? Just give us a call. We would be delighted to configure a system that caters exactly to your needs.

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Figure 9: User interface for the HEAD VISOR software with automatic microphone control (displaying the array geometry)

## ENGINEX\_MOD419\_TEST17BX\_25112008\_GH.HDF

### Do you have file names like this on your hard disk?

Then take a look at our HEAD Data Portal. You can use this to produce structured documentation from your measurements and analyses. With a minimum of effort you can create input forms and documentation templates, to which you can “attach” any number of files or directories. Much like the Windows Explorer in appearance, the user interface helps you to navigate through all of the files on local and network drives. It gives you an overview of all of your measurement data, and it helps you to make comparisons with ease. Integrated viewers for various data types such as HDF, PDF, HTML files and various image types help you to inspect even large quantities of data and to create, view and edit your documents. Documented data is stored in XML format, which can be exchanged between computers and archived.

### Seamless operation with the HEAD Recorder

Documentation files can be created directly while recording with the new HEAD Recorder 2.0. All you have to do is to integrate the creation of user documentation for recorded files into your flow-control procedures.

### Search and navigation

If required, data of your choice can be indexed in a local MS SQL Server Express database, providing you with fast search facilities and navigation through virtual directories. Relational database models mean that you don't have to think about a thing: the model is automatically derived from your

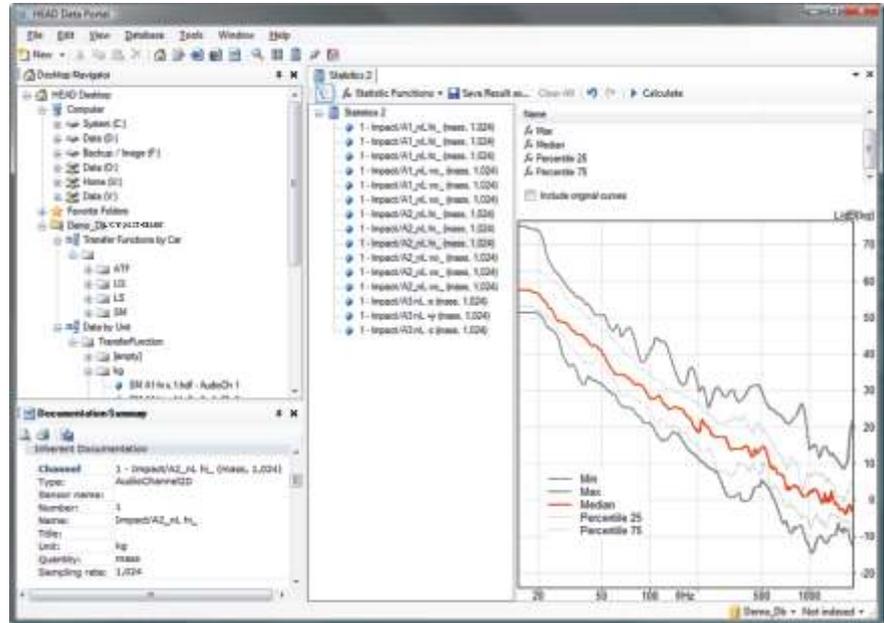


Figure10: HEAD Data Portal with statistics module

documentation. Along with the documentation that you create, the indexing service also records technical information contained in the data such as channel names, units, UDI and sensor data. This information can also be used for searching.

### Data viewer and statistics

The HEAD Data Portal also has convenient features for the further efficient processing of your data. Now interactive and uncomplicated, the newly designed Data Viewer allows you to divide your data between one or more diagrams, allowing you to make comparisons quicker.

The statistics module allows 2D data sets, such as sequences of levels or transfer functions, to be displayed comparatively, and to calculate scatter bands from a

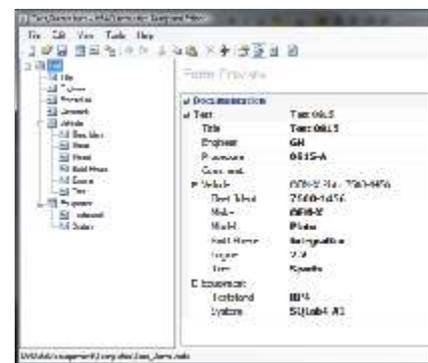


Figure 11: Generation of document templates

mass of vectors. Statistical indices such as mean values, median, percentiles or standard deviations can be inserted with a mouse click.

We would be delighted to provide you detailed information on the HEAD Data Portal – just drop us a line: [info@head-acoustics.de](mailto:info@head-acoustics.de)

## HEAD Noise Event Manager

Save time with your analysis and documentation of noise events and when detecting noise sources

The HEAD Noise Event Manager is a software for the simple and flexible examination, correlation, reproduction, management and documentation of noise-event recordings and the parameters relevant to noise generation. This is an excellent way of investigating the correlation between annoying noises and the environmental conditions responsible for them. The HEAD Noise Event Manager excels when examining data recorded by the BrakeObserver when investigating braking noises.

In particular, large series of measurements can be quickly viewed and comprehended with the HEAD Noise Event Manager. Engineers gain needed time to influence the noise quality of a product during its development and optimization. When compiling reports of the results, parameters relevant to noise development can be displayed effectively. This allows conclusions to be drawn on the causes of unwanted noise. Reporting templates and various diagram types are available to the user, who can freely configure these elements as required. In order to be able to make subjective evaluations and detailed analysis of individual critical noise events, even in the middle of large quantities of measurements, the HEAD Noise Event Manager provides a convenient playback function with detailed graphical display. Noise events on the diagram can be directly accessed with a mouse click. Relevant

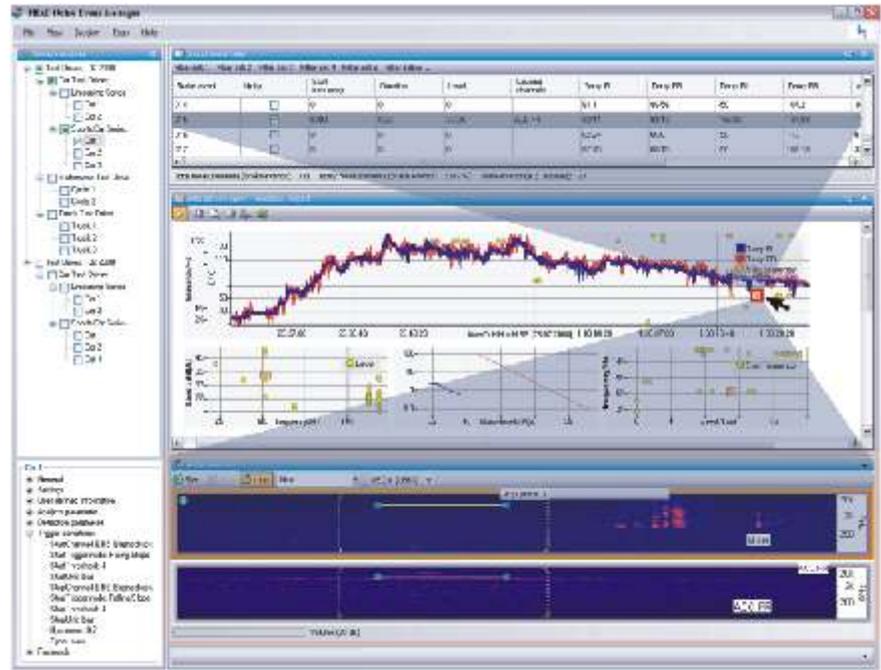


Figure 12: The results of large series of measurements can be managed with ease (tree and detailed views left). Selecting a series of measurements from the tree produces a tabular overview of the noise events along with their environmental conditions (above). There is also a complete report containing various freely-definable diagrams which display the noise events in correlation to their environmental conditions (middle). If you select a result from the table or a diagram, then the associated noise is played back on request and you can closely examine a spectral analysis of the event. You can interactively select different parameters for the X and Y axes (e.g. pressure, temperature, velocity). These parameters can be instantly correlated with the noise.

measurements for the noise event are displayed clearly, the noise is played back automatically, and the noise event is marked in the graphical analysis. Along with the interactive procedure for data analysis, the arrangement of the diagrams can be saved as a custom template. Simply click on the series of measurements to be viewed to produce a standardized report.

All in all, the HEAD Noise Event Manager offers great potential for

optimizing the results of your work, while simultaneously saving considerable amounts of time.

Find out more about the HEAD Noise Event Manager:

[www.head-acoustics.de/de/nvh\\_noise\\_event\\_manager.htm](http://www.head-acoustics.de/de/nvh_noise_event_manager.htm)

## Latest version: HEAD Recorder 2.0

Along with the familiar, fully customizable user interface, the latest version of the programmable recording software HEAD Recorder offers new features and benefits: The Analysis Trigger allows you to trigger, for example, on an A-weighted signal level or, when using the FFT spectrum, on a pre-defined frequency. Once set, the Analysis Trigger initiates the recording.

The new Calculation Term Editor

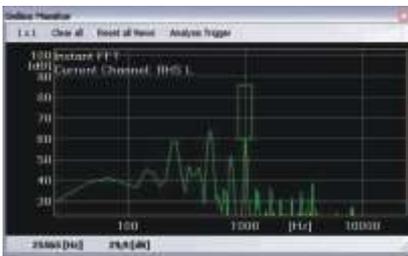


Figure 13: Analysis trigger

enables new channels to be generated online, stored, and selected when triggering. The HEAD Recorder 2.0 uses available channels to calculate the sum, the mean value, etc., or individually defined factors. For example, this enables the determination of  $c_w$  values, or the combination of data from various CAN buses to form a new channel. If a front end has too few pulse inputs, analog signals can be used to generate pulse channels for triggering and recording.

The front end of HEAD Recorder 2.0 can be (pre)configured, even if it is not available at that moment. A virtual front end allows individual settings to be adjusted and saved. When a real front end is connected the full configuration

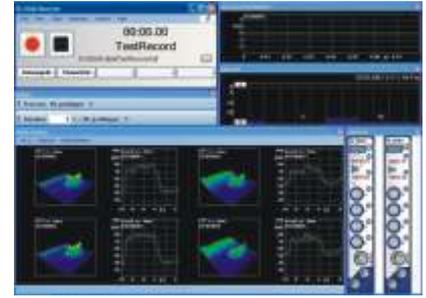


Figure 14: The number, size and position of the various windows can be adjusted to your needs

from the virtual front end can be transferred to the real one.

We would be delighted to send you information on this and other innovations. Contact us: [info@head-acoustics.de](mailto:info@head-acoustics.de)

## DATARec 4 now also available as a stand-alone front-end system

DATARec 4 has been well received by the market due to its flexible scalability and robustness.

DATARec 4 can be operated as a compact and decentralized measuring system with a very high number of channels, and is able to meet the most demanding of requirements.

The specialized link module allows DATARec 4 to operate as a stand-alone data logger. Measurements can be recorded directly to a connected memory module. Thus there is no need for a computer to record the data and control the system, which is a great advantage for mobile applications.

Data saved to the system memory is read out by the HEAD Frontend Reader. Transferred data can be

immediately analyzed and post-processed by ArtemiS. DATARec 4 also functions as a classical measurement front end because of its flexibility. It can fulfill the most varied of tasks demanded from a modern data recording system. It allows individual signal modules (ICP®, Line, Charge, AES/EBU, RPM, CAN-BUS, etc.) to be directly connected to computers via USB. Immediate operation is possible in combination with the HEAD Recorder. In a few easy moves, the separate modules convert into an individually configured multi-channel front end. The link module synchronizes the signal modules, and connects them to the computer.

The programmable recording software HEAD Recorder and the analysis software ArtemiS combine perfectly with DATARec 4. Together, they form a fully compatible total system: a system that is able to carry out your daily tasks such as data acquisition, analysis and results documentation.



Figure 15: Example configuration for a compact multi-channel front end

## Event Schedule

Did you know that ...

- ... NoiseBook 10 lets you export your measurement results in various image-data formats, and you can post-edit "active diagrams" with the HEAD acoustics diagram functions?
- ... HEAD Monitor and HEAD Explorer ease your workload? This software is available to you as freeware.
- ... The latest HEAD Recorder can reliably store measurements over a period of three hours and more?

### Tradeshows and conferences with participation of HEAD acoustics during the next months

05.-09.07.09	16th International Congress on Sound and Vibration (ICSV), Krakow, Poland
23.-26.08.09	Internoise 2009, Ottawa, Canada
15.-17.09.09	Automotive Testing Expo China, Shanghai
11.-14.10.09	27th Annual Brake Colloquium & Exhibition Tampa, Florida, USA
26.-28.10.09	EuroNoise 2009, Edingburgh, UK
26.-30.10.09	158th Meeting of the Acoustical Society of America (ASA), San Antonio, Texas, USA
27.-29.10.09	Automotive Testing Expo 2009, North America Novi, MI, USA

More information about HEAD acoustics at these conferences (booth number, topics of lectures etc.) can be found on our homepage:  
[www.head-acoustics.de/de/trade\\_\\_fair.htm](http://www.head-acoustics.de/de/trade__fair.htm)

### Overview of workshops offered by HEAD acoustics

17.-18.08.09	ArtemiS Basics (english)
19.-20.08.09	ArtemiS Advanced (english)
21.08.09	ArtemiS Application Examples (english)
25.-26.08.09	ArtemiS Clinic (english)

Are you interested in attending any of these courses? Or would you like to receive a tailor-made, user-specific training? Then contact our local sales representative to obtain more information.

The training courses are held at the HEAD acoustics' headquarters in Herzogenrath, Germany, or at your own company's premises.



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