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## 25 years of HEAD acoustics

### A pioneer in innovative acoustic measurement technology since 1986



Our customers and business partners benefit from the long-term experience, know-how and innovation that have characterized our company ever since its foundation. We stand by your side with expertise and reliability, while at the same time focusing on future challenges in the area of acoustics, such as those posed by electromobility or broadband voice transmission.

Prof. Dr.-Ing. Klaus Genuit  
Managing Director

We are proud to be celebrating our 25-year company anniversary this year. Since founding our company in 1986, we have become a leading international supplier of products and solutions for sound and vibration analysis.

Today, we not only set international standards with our technical reproductions of human hearing, we also pursue an integrated approach that accounts for all aspects of human perception of sound and vibration events.

Our company's success over the last 25 years was significantly shaped by the commitment shown by the HEAD-acoustics employees. I would like to take this opportunity to give a big "thank you" to all of them.

## HEAD acoustics: pioneer in acoustic measurement technology since 1986

For 25 years we have helped you to give your products the best possible sound quality. Since the image and acceptance of a product are closely connected with the quality of its sound, we offer you a way to gain a competitive design advantage.

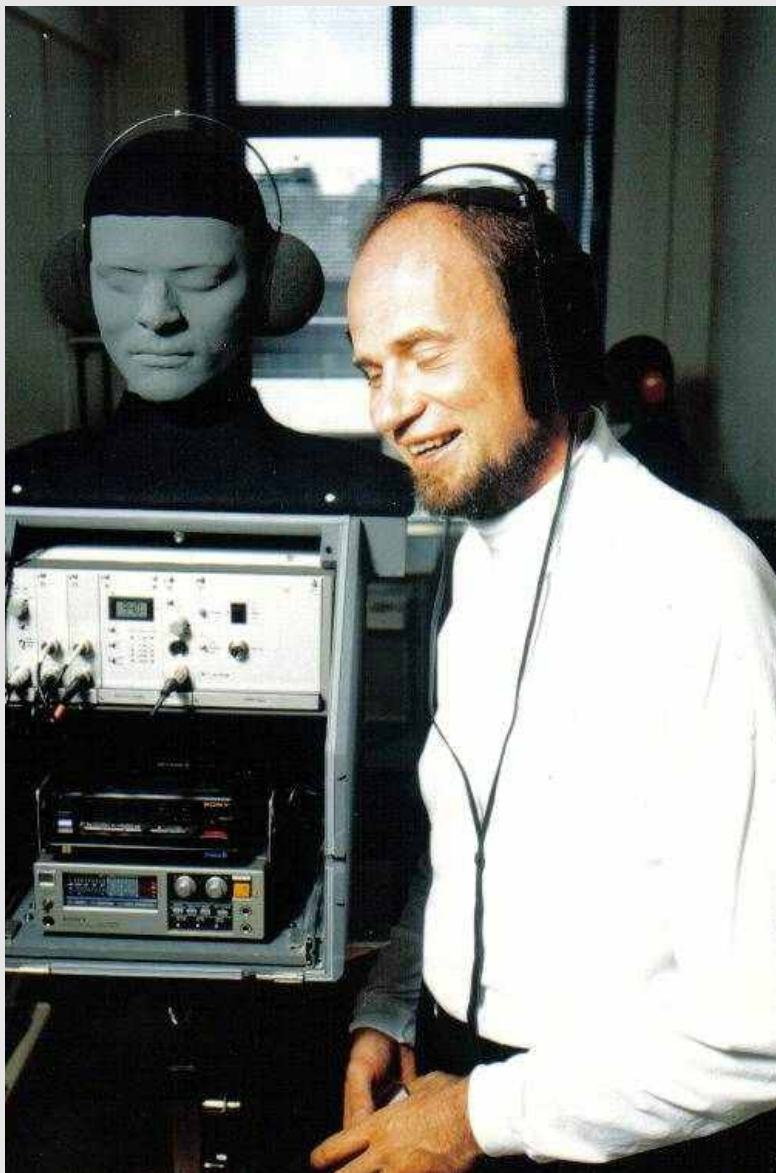
Our work focuses on sound optimization and sound design for technical products, as well as on solutions in the area of environmental noise. Furthermore, we deal with the assessment and optimization of voice quality of audio and communications devices, voice processing algorithms as well as communications networks and components.

We take on these challenges by offering you a wide range of products and services. Furthermore, you can benefit from our long-term experience, know-how and innovation that have characterized our company ever since its foundation. We stand by your side with expertise and reliability, while at the same time focusing on future challenges in the acoustics area,

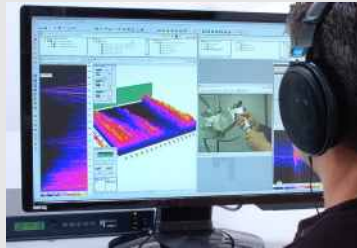
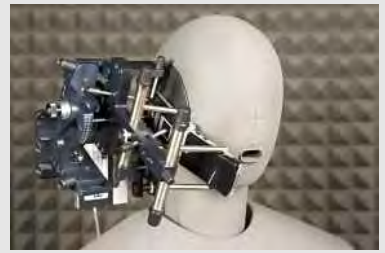
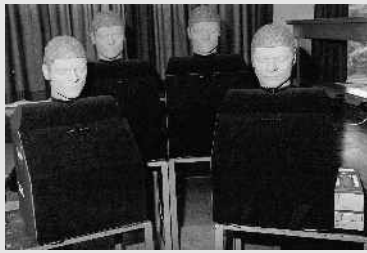
such as those posed by electromobility or broadband voice transmission.

HEAD acoustics GmbH was founded by Dr.-Ing. Klaus Genuit on August 11, 1986 at the Aachen Technology Center (TZA). Together with four employees, the mission was to establish the innovative idea of head-related recording and playback technology in the test and measurement industry. The AACHENHEAD® technology with a technical reproduction of human hearing allowed for aurally accurate and exactly reproducible recordings of sound events supporting all aspects of human sound perception, particularly spatial hearing. This allows a targeted identification and elimination of disturbing or unpleasant noise components and the derivation of measures to optimize various products. Over the years, this integrated approach – covering sound events, vibration phenomena and human perception – lead to the development of innovative sound, vibration and communications measurement technology as well as analysis methods for hearing-related sound assessment.

As early as 1989 we began to further develop this technology specifically for telecommunications applications. Since this required an artificial mouth, our artificial head also “learned” to talk.







The continuous additions to our range of services meant that the company kept growing, and relocation from Aachen to larger facilities at the Herzogenrath Technology Park became necessary back in 1989. In 1996 HEAD acoustics finally moved to the current premises at Ebertstrasse, which was enlarged with a new building in 2008 and today provides not only office space, but also state-of-the-art test stands and sound measurement rooms.

The company was subdivided into the business units NVH and Telecom in 1999 in order to meet our customers' demands in a more differentiated approach and to make better use of synergy effects. Services, technical support and training courses completed the scope of services from the two units.

Keeping close contact to our customers is very important for us. Therefore not only do we offer numerous product workshops, we also organize our "Acoustics Day" road show, an event held annually since the year 2000. Each September we present new products and methods in the form of practical application topics – at four events held throughout Germany.

We also invite you each year to our "NVH User Group Meeting", an event held since 2005. This meeting gives you the opportunity to talk to other customers and HEAD acoustics experts and to present your experiences with special applications and innovative methods. For our telecom customers, we conduct numerous seminars at the customers' or our sales partners' locations worldwide and at our own facilities.

Ever since our company was founded, innovation has been a prime focus of our activities. For example, the AACHENHEAD® technology made human hearing impressions accessible to objective measurement methods and allowed for aurally accurate sound analysis back in the mid-1980s. As the first binaural analysis system for aurally accurate sound analysis, our BAS

took care of the acoustic playback of the signals during the analysis.

HEAD acoustics continues to focus on research and operates its own research department. We collaborate closely with universities and other scientific institutions and participate in numerous national and international research projects. The success of our research and development activities is demonstrated by numerous patents and publications.

We aim to keep providing you with state-of-the-art functional solutions, extensive know-how and innovative approaches to your tasks. You are "always a step aHEAD" with us.

Learn more about 25 years of HEAD acoustics and our corporate history at [www.head-acoustics.de/eng/about\\_us\\_25.htm](http://www.head-acoustics.de/eng/about_us_25.htm).







| Application |

## **A stormy affair:**

### **HEAD VISOR in the wind tunnel of FKFS**

With speeds of up to 265 km/h (165 mph), the wind blows through one of the most advanced aero-acoustic vehicle wind tunnels in Europe. A twelve-blade axial fan with a diameter of 7.10 m (23.3 ft) ensures a realistic simulation of head winds, the steel belts of the five-belt system simulate the paved road surface, and special broadband absorbers mute any noise.

The 1:1 vehicle wind tunnel has been operated since 1989 by the Research Institute of Automotive Engineering and Vehicle Engines (FKFS) in Stuttgart, an independent institute providing research and development services for the international automotive industry. As an optimal testing environment for aerodynamic examinations of passenger cars, vans and racing cars, numerous manufacturers use

the facility to optimize the aero-acoustics of their vehicles.

Why sound optimization in aero-acoustic wind tunnels?

While engine noise dominates in the run-up phase and during accelerations at low speeds, noise from the tires on the road is the most prominent component at speeds up to about 130 km/h (80 mph). At even higher speeds, aerodynamic wind noise becomes

increasingly dominant.

In conventional wind tunnels, the isolated recording of aerodynamic vehicle noise has turned out to be difficult or even impossible, especially for exterior aerodynamic noise. To examine these noise components, aero-acoustic wind tunnels are therefore indispensable. They are built with noise reduction in mind, and their design ensures that the

fan noise cannot be perceived in the test area. The open-jet test section itself, too, is made as anechoic as possible.

Working in the aero-acoustic wind tunnel

Early in the morning, project leader Dr. Matthias Riegel and his team are ready to receive the latest research object. As part of a development service, two acoustics engineers and an employee of the car manufacturer examine a clay model in order to obtain information about possible optimizations regarding the aerodynamic noise of the future vehicle. Equipped with the latest technology, the wind tunnel not only allows the application of acoustic research methods, but also a wide range of additional testing possibilities for measuring forces, pressures and speeds, as well as air flow visualization.

For about a year now, the team has also been using the HEAD VISOR, the system for the localization of sound sources from HEAD acoustics for resolving acoustic issues.“

We use HEAD VISOR for all tasks

that have to do with the optimization of exterior vehicle noise for automotive development”, explains project leader Dr. Matthias Riegel.

For example, clay models of future vehicles are used to correct the shape of the rear view mirrors or the air flow at the A-pillar, or to improve the windshield wiper sound. “For this kind of research, beam-forming systems are generally very well suited. HEAD VISOR possibly offers the best software and features in this area. One thing I find very important is the possibility to identify coherent noise sources that way we can easily find out, for example, whether the wiper noise is relevant for the driver's left ear at all”, says Riegel.

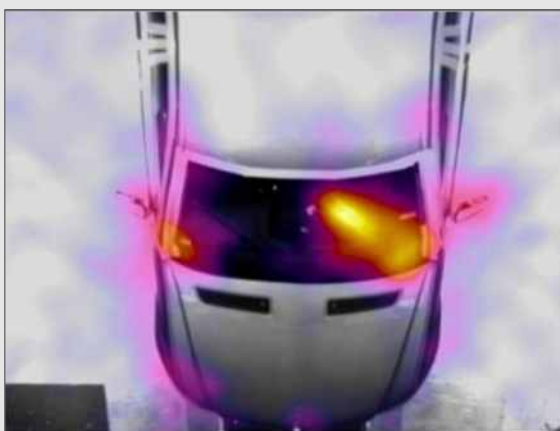
In order to point HEAD VISOR exactly at any desired measurement area from above or from the side of the vehicle while keeping it outside the air stream, the system is mounted on a traversing unit. Windscreens protect the array system from noise interference that could otherwise be caused by air turbulence at the microphones. Furthermore, the current wind

speed is recorded by HEAD VISOR as an additional pulse channel, which allows for a correction of the spatial offset caused by the fact that the emitted sound is transported along with the air stream when measuring in a wind tunnel.

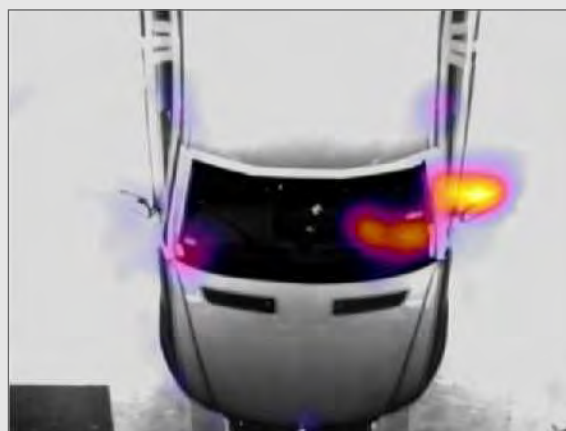
“For the kind of research we perform here, beam-forming systems are more of a supplemental measurement tool”, admits Dr. Martin Helfer, head of the vehicle acoustics and vibrations division at FKFS. “But exactly for that reason we wanted to have a really powerful system the HEAD VISOR. One of the impressive features of HEAD VISOR is its handling: Without a lot of training, one can easily operate the system with just a bit of practice, even without having read the manual.”

To learn more about the wind tunnel and FKFS, visit [www.fkfs.de](http://www.fkfs.de). Detailed information on the HEAD VISOR can be found at [www.head-visor.com](http://www.head-visor.com).

Coherence analysis for the evaluation of individual noise sources for various emission locations  
Identical measurement: 140 km/h, left wiper 45° on front window, 1250-3150 Hz third octave (source: FKFS)



Coherence with windshield vibration



Coherence with sound pressure at the driver's left ear



# Go aHEAD

## SQuadriga II – mobile multi-channel front-end and stand-alone recorder

As a new development based on experience gained with the successful SQuadriga measurement system, SQuadriga II provides you with the highest possible degree of functionality and mobility. SQuadriga II's compact size, light weight, built-in battery and a wide range of connection options, form a mobile recording and playback system optimally suited for a wide variety of tasks.

SQuadriga II is characterized by its versatility, offering connection possibilities for ICP® microphones and accelerometers, the binaural headset BHS I, pulse and CAN sensors, an artificial head, as well as other sensors. Besides the usual dynamic data, you can also record direct data such as brake pressure. The front panel of the system provides six ICP®-compatible BNC inputs and outputs as well as a connector for the BHS I, which can be used for aurally accurate

recording and playback. The inputs work with sampling rates between 8 and 96 kHz and provide optional high-pass filters for making recordings without interfering noise components. Furthermore, the input sensitivity can be individually adjusted for each channel.

Your measurement data can be saved either to the removable SD card or directly to a connected PC or notebook. SQuadriga II is operated effortlessly either by its function buttons and graphical color touch screen display or via the HEAD Recorder software on the PC. Both the channel configuration and the sensor configuration can be easily modified and saved directly via the touch screen. Power can be supplied via a power adapter, USB, a car adapter or the built-in rechargeable battery, which can have its operating time extended by adding replaceable batteries.

SQuadriga II is very handy and runs for several hours without external power thanks to its built-in battery. The system operates silently and is ready for use immediately after switching it on.

For measurements requiring higher channel counts, two SQuadriga II units can be combined into one system. Furthermore, you can combine SQuadriga II with your HEADlab and use it as a controller together with a HEADlab signal module or as an additional signal module within a HEADlab system.

See for yourself at [www.head-acoustics.de/eng/nvh\\_squadriga\\_II.htm](http://www.head-acoustics.de/eng/nvh_squadriga_II.htm). Please contact us with your questions at any time – e-mail us at [sales@head-acoustics.de](mailto:sales@head-acoustics.de).



Touchscreen with function buttons



Connections on the front



Connections on the rear



## HEADlab – extended functionality

After the successful product introduction, the functionality of the HEADlab multi-channel front-end system is now extended by the latest firmware version in combination with the new version of the HEAD Recorder.

You can now connect two *labCTRL* I.1 controllers to the PC via USB and operate them simultaneously, allowing you to

record up to 120 analog channels with sample-accurate synchronization - in addition to the AES/ EBU, pulse and CAN inputs of the controllers.

The new firmware also offers you extended support for different sampling rates and supports TEDS sensors via the *labV6* and *labVF6* input modules.

Another new feature is the possibility to operate the two pulse channels and the CAN input of the

controller simultaneously in USB mode, thus increasing the number of possible channels to 65. Furthermore, the data stream now only contains the signals of the actually activated channels (or modules). The resulting lower data rate allows speedy work even with a less powerful computer.

Do you have additional questions? Read more at [www.head-acoustics.de/eng/nvh\\_headlab.htm](http://www.head-acoustics.de/eng/nvh_headlab.htm) or e-mail us directly at [sales@head-acoustics.de](mailto:sales@head-acoustics.de).



## New modules for the HEADlab multi-channel system

The modular design of the mobile data acquisition system HEADlab gives you the flexibility to set up custom solutions. Helping you to be optimally prepared for an even wider range of tasks, the

product family continues to grow with your needs and will be extended with four new modules in the coming months. With *labV12*, *labHMS*, *labM6* and *labDX*, you can easily increase the channel

count and perform additional measurement tasks thanks to many new input connection possibilities.

Learn more at [www.head-acoustics.de/eng/nvh\\_headlab.htm](http://www.head-acoustics.de/eng/nvh_headlab.htm)



Signal module *labV12* with 12 Line/ICP® channels



Microphone module *labM6* with 6 LEMO inputs



Digital module *labDX* with HMS connection, 2 pulse and 2 CAN/FlexRay inputs



HMS module *labHMS* with 3 HMS connections



## **COST: Soundscape research**

HEAD acoustics has always been a pioneer in the development of innovative technologies. We count on a close cooperation with universities and other scientific institutions and, along with our own research and development work, we engage in numerous national and international research projects.

Currently, HEAD acoustics supports the EU-funded international and interdisciplinary “COST Network on Soundscape of European Cities and Landscapes”, which promotes the cooperation of junior scientists from all over Europe and enables them to jointly work on the topic of soundscapes and to exchange their know-how. Besides the education of the next generation of scientists, the network aims to further research the perception of environmental sounds. 32 international partners participate in the network. Germany is represented by the coordinators Prof. Dr. Brigitte Schulte-Fortkamp and Prof. Dr.-Ing. Klaus Genuit.

Within the promotion of junior scientists, a “Short Term Scientific Mission” in 2010 and a “Training School” in 2011 were performed with the help of HEAD acoustics, which introduced the subject of “environmental noise and soundscapes in urban areas” to participants from all over Europe. This was accomplished by means of theoretical and practical exercises



focusing on measurements using binaural measurement technology, psychoacoustic analysis, and various evaluation methods. In field and laboratory examinations, specific urban environments were recorded, analyzed, evaluated and classified.

and wrote down their findings. In the evaluation that followed, it became apparent how complex the subject of soundscapes is and that unpleasant noise perceptions are caused by many more factors than just sound volume. Judgments made in the laboratory turned out not to reflect the impression of the real-life situation. For example, a characteristic structure and occurrence of special sound sources evoked specific reactions that cannot be modeled with a simple sound pressure level value. Therefore, psychoacoustics plays an essential role for the assessment of environmental sounds.

Using the mobile measurement system SQuadriga and the binaural headset BHS I, the participants performed “sound walks” in the city of Aachen. Divided into two groups, they followed a predefined route in opposite directions, made recordings at predefined locations



# ACQUA 3.0

## Trend-setting third-generation voice quality analysis system

Ten years after the first ACQUA version, which replaced the DOS-based predecessor CAS, HEAD acoustics is pleased to present ACQUA 3.0, the third generation of the communications analysis system that is now used extensively throughout the world.

Today we have had to come to terms with a significant new technology leap that is similar to the situation back when the transition from the old DOS to the new Windows world posed a big challenge to both developers and users alike: For example, the new database architecture based on the latest SQL server technology from Microsoft®. Considerably faster data processing, enhanced database management, and the possibility to use external SQL tools come at a price: Customers must convert their existing databases. The dongle technology is new, too, and requires the replacement of existing dongles, but offers fundamental advantages in return: The new

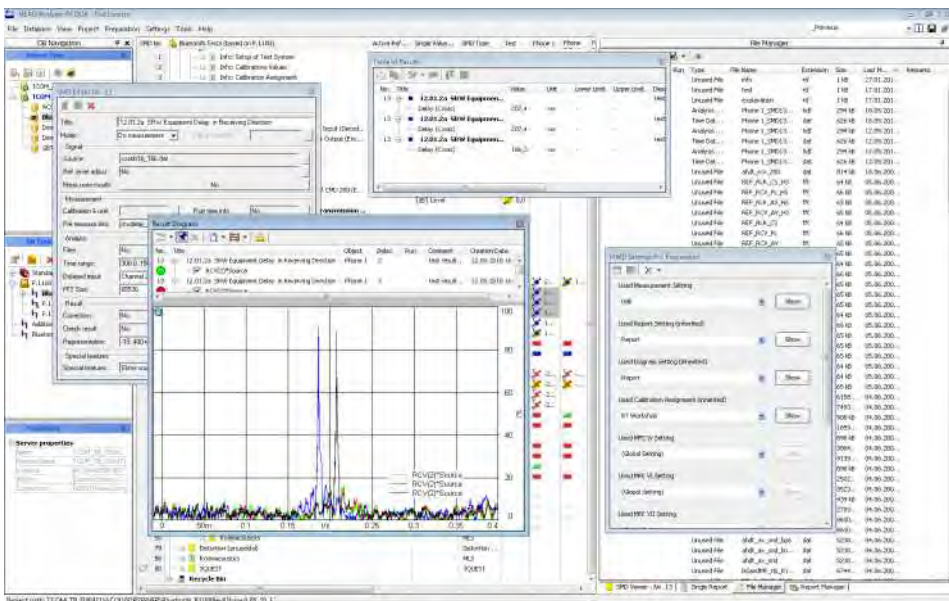
HASP dongles facilitate the use on multiple computers, as “key files” are no longer required. The new dongles also enable a new network licensing model that allows, for example, certain ACOPTs to be used on different computers in the network via a booking system. The product version “ACQUA Workplace” can also be shared by several users via the network booking system thanks to a HASP dongle. Another important feature is support for the latest Microsoft operating system Windows® 7, which – unlike Windows® Vista – has meanwhile become a worldwide standard. A particularly interesting feature is the possibility to use the variant “Windows® 7 Ultimate” in connection with a language pack for operating system languages other than English or German.

Furthermore, ACQUA 3.0 excels with its new window technology and a completely new “look & feel”: Parts of windows can be shown or hidden, freely



repositioned, docked to other windows or even moved to another monitor thanks to multi-screen support. These custom window layouts, modified by the user according to his needs, can even be saved. Of course, many suggestions and wishes from the global community of ACQUA users have been incorporated as well.

ACQUA 3.0 therefore proves to be the state of the art in communications measurement technology. With ACQUA 3.0, HEAD acoustics is once again responding to its customers' needs by offering complete, one-stop solutions that are future-proof investments thanks to trend-setting technologies and continuous improvement.



New “look & feel” with customizable, storable window layouts



## HEAD Telecom – always “one step aHEAD” in standardization

For more than 22 years, the Telecom business unit of HEAD acoustics has made significant contributions to the development of new telecommunications standards. At the same time as Dr. H. W. Gierlich joined HEAD acoustics in 1989, HEAD acoustics began to participate in various standardization committees in the telecommunications industry. The first were the European Telecommunications Standards Institute (ETSI) – where HEAD acoustics was active ever since the ETSI was founded – and its international equivalent run by the UN, the International Telecommunication Union (ITU-T), where HEAD acoustics contributed results and findings from its own research and development work.

For many years, HEAD acoustics has also taken a leading role in the standardization area: For example, Dr. Gierlich is chairman of FG Car-COM, which originates from the ITU-T FITcar Focus Group and develops future-proof standards for hands-free communication in vehicles, and Vice Chair at ETSI STQ (Technical Committee for Speech Processing, Transmission and Quality Aspects). At the ITU-T, HEAD acoustics contributed, e.g. to the standardization of artificial heads in the ITU-T recommendations P.57, P.58 and P.64 as well as to the development of the ITU-T recommendations P.501 and P.502, in which new measurement signals and methods were established.

Over the years, numerous other standardization committees were added, where HEAD acoustics presented its notions of optimal communications quality and its objective, reproducible measurability: ISO, DIN, ZVEI, 3GPP, IEEE, GCF, PTCRB, VDA, CTIA, DECT Forum...

A great deal of know-how from HEAD acoustics was incorporated into the standards for the evaluation of transfer characteristic of time-variant and non-linear systems. Examples are the ITU-T recommendations P.340 (hands-free communication) and G.168 (network echo compensators) or the ETSI standards for the assessment of IP-based terminal devices. A considerable part of these standards was based on the internal HEAD Quality Standards (HQS) developed from in-house research results and consulting experience. In 2001, the participation in the VDA (Association of the German Automotive Industry) resulted in a specification for hands-free communications equipment for cars, which soon became established as a quality standard not only in the German-speaking countries, but far beyond.

Within the participation in the DECT Forum, the “Test Specification Audio for CAT-iq™ Devices” was created in 2009, which has undergone continuous development ever since. All relevant standards, both global and internal, are implemented by HEAD acoustics in test databases for use with the ACQUA analysis system, enabling automated measurements according to the latest standard specifications or further analyses based on the extensive experience of HEAD acoustics.

For detailed information on the standards available in ACQUA and the corresponding datasheets, please visit the Telecom area on our website at [www.head-acoustics.com](http://www.head-acoustics.com).



Dr.-Ing. H. W. Gierlich, Unit Director HEAD acoustics Telecom  
(Source: ITU-T picture archive)

## HEAD Telecom and the full scope of communications measurement technology

Over the past two decades, the HEAD acoustics Telecom business unit has implemented many innovative ideas in its communications measurement technology.

Today the worldwide telecommunications industry relies on expertise and product solutions from HEAD acoustics across the full spectrum from algorithm development to certification.

No modern telecommunications device today can do with special processing algorithms, e.g. for echo compensation or background noise suppression. Even at early stages in the development of new devices, the communications analysis system ACQUA is applied to optimize the algorithms regarding voice quality. The optimized algorithms are then used by chipset manufacturers who also use ACQUA in order to optimize the design of their chipsets. The chipsets are then used by the

manufacturers of terminal devices, such as classic telephones, modern smartphones or hands-free equipment for cars, as well as the manufacturers of network components such as gateways. These manufacturers, in turn use ACQUA with the appropriate measurement front-ends and standards to ensure the best possible voice processing and transmission quality for their devices. But the work of ACQUA is not done here. Network carriers and service providers need either the consulting know-how of the Telecom specialists at HEAD acoustics, or they appoint internal or external test laboratories to perform suitable quality measurements in order to ensure their customers are getting the best possible service. However, this quality can only be achieved if all devices used in and at the edges of the network meet certain minimum requirements regarding voice quality. These test laboratories also depend on the

communications measurement technology from HEAD acoustics, not only to perform the measurements mentioned above, but also to provide the device manufacturers the necessary certifications. This is where the test platforms from HEAD acoustics certified by the GCF (Global Certification Forum) or its North-American equivalent PTCRB (PCS Type Certification Review Board) come in. A similar case is the certification of HD-voice-capable CAT-iq™ devices: In order to be certified and allowed to carry the coveted CAT-iq™ logo, the device must comply with the applicable requirements of the CAT-iq™ audio test specification. HEAD acoustics not only contributed significantly to this specification as a partner of the DECT forum, but is also the world's only supplier of the corresponding measurement system.

Wherever you look in the world of telecommunications, across all development stages and application areas, in landline, mobile and IP telephony... the telecommunications measurement technology from HEAD acoustics plays an important role. It is an absolute "must" for all global players wishing to achieve worldwide success and quality leadership.



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Voice quality – not only a question of service



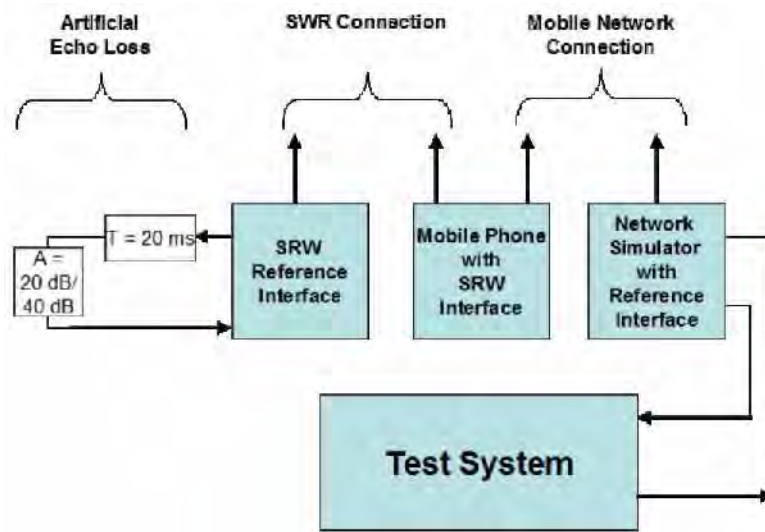
## Bluetooth audio front-end MFE XI with new features

Available since late 2010, the MFE XI measurement front-end is a universal Bluetooth audio interface from the development laboratories of HEAD acoustics. It supports all common Bluetooth profiles, such as HFP (Handsfree Profile) AG/AF (AG = Audio Gateway), HSP (Handset Profile) AG/AS and A2DP (Source/Sink).

A firmware update scheduled for October 2011 will add support for the profiles HFP WB and HFP AG WB (WB = Wideband).

After the update, MFE XI will operate not only in connection with an ACQUA measurement system, but also as a stand-alone unit (e.g. with Audio Precision) via AES/EBU. The stand-alone solution will then also support the A2DP profile, which already exists on the hardware side today.

The most important new feature: In HFP AG (NB and WB) mode, the new version will allow hands-free equipment to be tested without a network simulation (GSM/UMTS).



Schematic test setup for SRW transmission

(Source: ITU-T P.1100)

Such measurements are demanded by new telecommunications standards, such as ITU-T P.1100. The MFE XI can handle all tasks of the Short Range Wireless (SRW) reference interface and also features a suitable Echo Canceller

(EC) simulator. A typical application scenario is the testing of the audio signal processing of mobile phones after transmitting AT commands via the Bluetooth interface.

## New version of HAE-car/HAE-BGN

The new version 2.1.100 of the software modules HAE-car/HAE-BGN for the automated equalization of background noise in vehicles or laboratories has been available since the summer of 2011. Owners of the preceding version can purchase the updates UG-HAEcar or UG-HAEbgn to take advantage of these new features. Unfortunately, free upgrades are not possible, since there is no maintenance program (SMA) for HAE-car/HAE-BGN.

New features:

- Windows® 7 is now supported.
- Level adaptation for binaural background noise is implemented in HAE-BGN

according to ITU-T G.160.

- The background noise library of HAE-BGN has been extended (BGN file "Male Single Voice Distractor" added).
- The PCI Express card RME HDSPe AIO is now supported.
- Some minor bugs were fixed.

Technical information:

- The new HASP dongle generation is supported as well as the old Sentinel dongles.
- No dongle replacement is required for existing customers.
- The following Microsoft Windows® versions are supported (including all the latest service packs):
  - XP Professional SP3 (x86 = 32

bit), English or German version

- 7 Professional (x86 = 32 bit or x64 = 64 bit), English or German version
- 7 Ultimate (x86 = 32 bit or x64 = 64 bit), English or German version, with any language pack

The multi-serial card MOXA C104H is no longer included, since PEQ V supports USB and the RS-232 connection is obsolete. However, the MOXA card is still supported by the software.

## Scream as loud as you can!

Children test their preferred volume on the Day Against Noise 2011

On April 27, 2011, this year's Day Against Noise (Tag gegen Lärm) in Germany, HEAD acoustics has followed a call by the German Institute for Standardization (Deutsches Institut für Normung, DIN) and participated in the campaign "Children get their hearing license". About 100 children aged between six and twelve years were invited to experiment with various noise sources at several stations and to learn how to protect themselves from loud noise.

Studies have shown that a significant portion of teenagers in Germany already suffers from hearing damage, so they start their first job already with impaired hearing. According to the Berufsgenossenschaft Bauwirtschaft (institution for statutory accident insurance and prevention in the building trade), 25 percent of German adolescents today no longer have their hearing intact. The most alarming fact is that this number increases year after year. Listening to loud music through an MP3 player is one of the main reasons for hearing damage of children and adolescents. When hearing music via an MP3 player, average teenagers expose themselves to a



Our HMS IV artificial head measurement really got an earful on the Day Against Noise 2011.

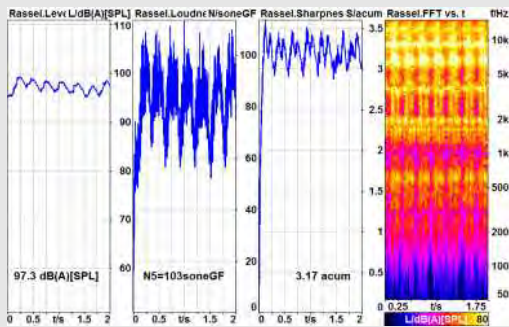
sound pressure level of 95 dB(A). That is equivalent to the sound pressure level of a buzz saw at a distance of one meter (three feet).

At the joint booth of the Technical University of Berlin and HEAD acoustics GmbH, children tested at which volume setting they preferred to use their MP3 player. The test employed a standardized procedure for determining noise emissions from nearby sound sources using our artificial head

measurement systems, which allow an almost perfect physical reproduction of human hearing.

Our artificial head had to bear quite a lot on that day, since the children also tried extreme volumes, screaming at the head with levels exceeding 130 dB(A).

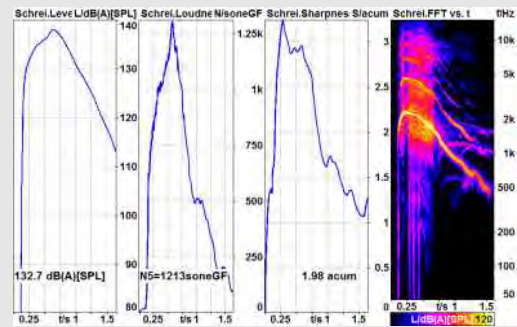
You can listen to the results of this "loudness test" at [www.head-acoustics.de/taggegenlaerm.htm](http://www.head-acoustics.de/taggegenlaerm.htm) but be careful: It's really loud!



Analysis of the crackling (level, loudness, roughness and FFT vs. Time analysis)



Test, which sound volume of the MP3 player is most comfortable



Comparison of level, loudness, roughness and FFT vs. Time analysis of a child's scream



## Social mobility and communication in the year 2036

On September 23, 2011, HEAD acoustics GmbH celebrated its anniversary with a symposium focusing on the revolution of social mobility and communication and their effect on the future of our society.

To prepare the symposium, six international experts joined HEAD acoustics GmbH for a workshop titled "A Vision of our Society's Mobility and Communication" that dealt with this challenge. The results were discussed at the symposium and covered the subject areas of technology and energy, communication and information, corporate governance and social responsibility, new

networks and distributed artificial intelligence, environment and traffic, soundscape and acoustic ecology, economy and finance, mobility and acoustic worlds.

The results from the symposium were then prepared and published on our website.

According to the corporate motto "Always a step aHEAD", this symposium is another step into the

future by HEAD acoustics to continue to meet the growing demands from customers for innovative and tailored solutions.



| HEAD in figures |

# 824

The *labV6* signal module of our HEAD*lab* front-end series consists of exactly 824 components. 760 of them are mounted on the circuit board.



| Application |

### Did you know that ...?

- ... monitoring with SQQuadriga or SQQuadriga II helps to identify and locate noise sources in airborne or structure-borne sound with your own ears?
- ... you can specify a frequency offset for the order calculation when analyzing noise from electric motors? This is an excellent method to quickly and conveniently identify, analyze and filter the frequencies of pulse-width-modulated electric drives.
- ... ArtemiS provides variable filters with an attenuation curve that you can customize relative to both time and rpm?
- ... You can combine our network licenses with individual workplace licenses? Use your licenses in the most efficient way!
- ... the ArtemiS SUITE allows you to include user documentation in a report?
- ... SQQuadriga II saves measurement data directly in HDF format?

# 25 Jahre

## HEAD acoustics – from an innovative idea to a successful company

For 25 years, HEAD acoustics has actively participated in the development of the acoustics world. The most important milestones in the corporate history show how a company born of a vision has developed into a globally leading expert in the areas of sound and vibration analysis as well as voice quality optimization.

