

ViBRIDGE: Holistic Testing of In-Ear Headsets with Bone Conduction Sensors

Headset manufacturers increasingly consider noise-free bone conduction to improve speech transmission in their in-ear headsets. Especially in noise-filled environments, the voice of the person talking can be better separated from ambient noise or competing talkers' voices if in-ear headsets detect bone conduction. Bone sound detection, therefore, serves as the basis for optimally suppressing noise and thus improving speech quality, especially in noisy environments.

Sophisticated technologies such as echo cancellation and other signal processing in in-ear headsets also benefit from perfect voice recognition. Assuming a good bone conduction recording, the direct transmission of the bone conduction can lead to a speech signal that has already been optimally suppressed in the low-frequency range.

However, even though some manufacturers of modern in-ear headsets already use bone sound sensors, they are squandering much of the potential that their use offers since, until now, no suitable measurement technology that holistically measures such products has been available for testing and optimization. They have had to perform tests laboriously with test subjects, and the results are difficult to reproduce. Verifying the design under laboratory conditions, especially in test houses, has not been possible – so far.

HEAD acoustics tests holistically

This is where HEAD acoustics comes in: We enable realistic testing of in-ear headsets with bone conduction sensors in the transmitting direction, i.e., the direction in which the user's spoken signal is transmitted. For this purpose, we use our artificial head [HMS II.3 ViBRIDGE](#) and excite our artificial ears [HEL/HER 4.4 ViBRIDGE](#) with a vibration generator (actuator) – comparable to the average bone sound excitation in humans.

How much bone conduction do you need?

To get to the bottom of the question "Which frequency components of the voice reach the inner ear via the bones, and at what volume?" we have carried out numerous measurements with human talkers. Bone conduction sensors in in-ear headset replicas allow us to measure how bone conduction "sounds." These measurements give us a good overview of the individual differences for each talker and allow us to determine the average bone sound transfer function. We reproduce this with an actuator in the artificial ear of the artificial head and obtain a perfect simulation that corresponds to the results of the measurements from our tests. This means: With HEAD acoustics [ViBRIDGE](#), manufacturers can test their in-ear headsets with structure-borne sound sensors holistically, correctly, reliably, and reproducibly in the lab.

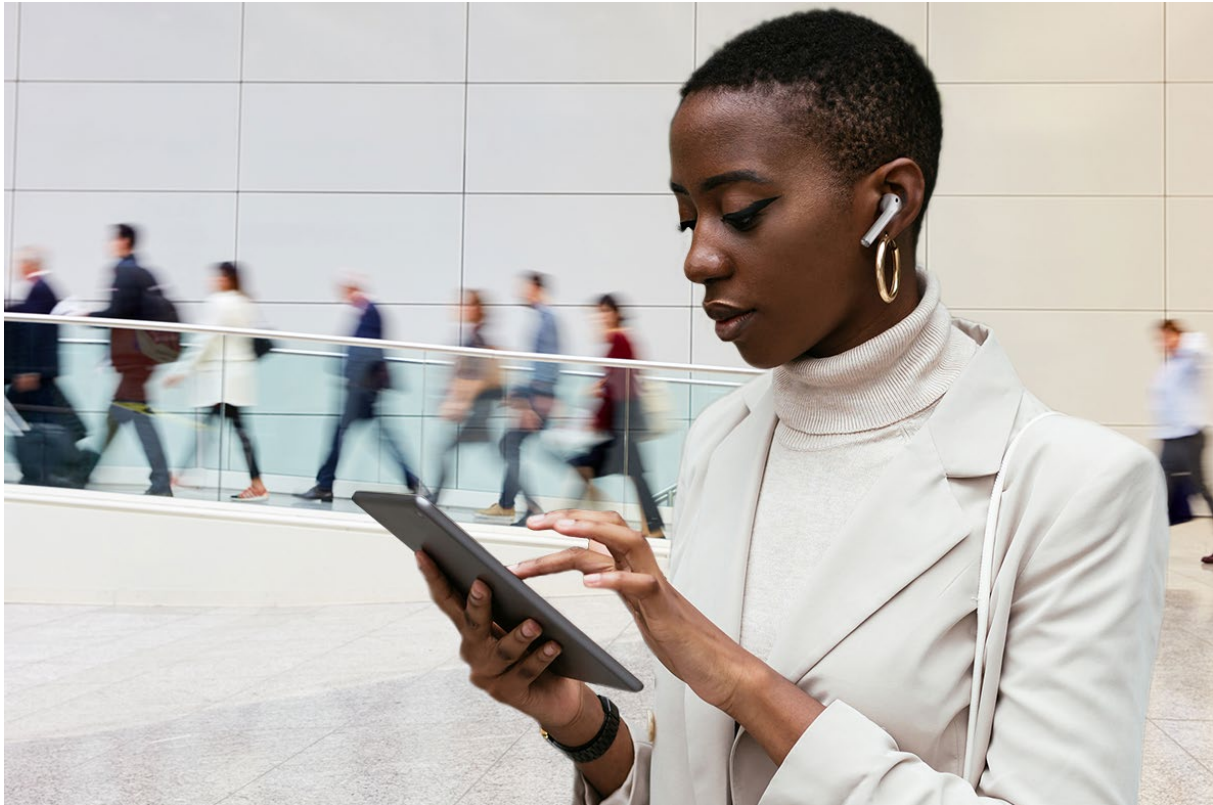
What do you need?

HEAD acoustics offers a complete all-in-one solution for testing, optimizing, and validating appropriate headsets. For the simulations, we use the [HMS II.3 ViBRIDGE](#) artificial head and the [HEL/HER 4.4 ViBRIDGE](#) artificial ears, as well as:

- [3PASS lab](#), our software for automated background noise simulation, in combination with the hardware platform labBGN
- [ACQUA](#), the measurement and analysis software to control the entire test sequence in interaction with [labCORE](#), the modular hardware platform for speech and audio quality tests
- the [HQS-ViBRIDGE](#) test suite for testing and optimizing in-ear headsets

Only with a standardized, complementary simulation of airborne and structure-borne sound components generated by the human voice is it possible to evaluate and optimize in-ear headsets in various conversational situations objectively, holistically, and reproducibly.

Do you want to learn more about bone conduction and headset testing? Visit our [website](#)!



About HEAD acoustics

HEAD acoustics GmbH is one of the world's leading companies offering holistic sound and vibration analysis solutions. In the telecom sector, the company enjoys global recognition due to its expertise and pioneering role in developing hardware and software for measuring, analyzing, and optimizing voice and audio quality, as well as customer-specific solutions and services. HEAD acoustics' range of services covers sound and vibration engineering for technical products, investigation of environmental noise, speech quality engineering, training, and support. The medium-sized company from Herzogenrath near Aachen has subsidiaries in China, France, India, Italy, Japan, South Korea, the UK, the USA, and numerous sales partners worldwide.