CASE STUDY

Life-changing hearing health and the role of HBK's HATS

Demant

Demant is a world-leading hearing healthcare and technology group built on a heritage of care, health, and innovation since 1904. The Group offers innovative technologies, solutions, and expertise to help people hear better. In every aspect, from hearing care, hearing aids and hearing implants to diagnostic equipment and services and audio solutions, Demant is active and engaged. Headquartered in Denmark, the Group employs approximately 20,000 people globally and is present with solutions in 130 countries where they create life-changing hearing health and high-end audio and video solutions.

Image courtesy of Demant

CHALLENGE

To stay ahead of technological advancements while meeting user expectations for natural, comfortable sound quality and seamless communication.

SOLUTION

An HBK Head and Torso Simulator (HATS) equipped with ear and mouth simulators for development and testing purposes can help with testing new solutions. HATS, specifically designed for in-situ electroacoustic tests, provides a lifelike replication of the acoustic properties of an average adult human head and torso.

RESULT

HATS not only accommodates optimised audio quality and speech intelligibility but also traditional as well as standardised electroacoustic measurements and flexible, open processes, aiding the development of new hearing aid technologies and features.

THE RISING TREND IN HEARING LOSS

According to the World Health Organization, it is estimated that by 2050 over 700 million people – or 1 in every 10 people – will have disabling hearing loss. This widespread issue is mainly fuelled by the aging population. Consequently, the market for hearing care is witnessing significant growth.

Audiology device manufacturers face a unique set of challenges that go beyond ensuring sound quality and effective background noise reduction. They must also address the increasing demand for personalised solutions and designs tailored to individual inner and outer ear conditions.

Demant's hearing aid business includes brands like Oticon, Bernafon, Sonic and Philips. They all aim to contribute to a world where hearing loss imposes no limitations by challenging conventions and pushing the boundaries of technology to improve the lives of people with hearing loss.

FROM DEVELOPMENT TO TESTING

Michael Syskind Pedersen is a Senior Principal DSP Engineer at Demant. With an MSc and PhD from the Technical University of Denmark (DTU), he specialises in digital signal processing, specifically acoustic signal processing, beamforming, noise reduction, and machine learning. He works on cutting-edge communication technologies such as Demant's OpenSoundNavigator™, which can analyze a 360° soundscape, preserve clearly identified sound sources in the front half of the listening field, reduce sound sources at the back and sides, and eliminate more diffuse sources of sound, resulting in an improved listening experience.

Demant has extensive experience using HBK equipment. For Michael, HBK's Head & Torso Simulator plays an integral role in his daily work. He emphasises, "Understanding the acoustic properties of a hearing device mounted in an ear is vital, as is discerning the acoustic differences among different hearing devices. For this purpose, we require a standardised setup to ensure that the observed differences result from the instrument itself and not other acoustic variables. As part of making standardised acoustic measurements, I use an HBK HATS. With a pair of hearing aids mounted on a HATS, we can measure the acoustic properties of the hearing aids from various directions."

"One of the most important features is the measurement of directivity index. Using the HATS, we can measure directivity index of the different hearing aids including the directivity index improvement obtained from the noise reduction algorithms. The directivity index is a well-known objective way of assessing improvements of directional algorithms. Due to the standardised HATS, the directivity index improvement is easy to reproduce elsewhere."

TESTING

The HATS is also a familiar tool for the Demant testing team. Bertrand Smits, a System Test Engineer at Demant with a background in Applied Physics and Instrumentation from a French engineering school and Engineering Acoustics from DTU, has been working in acoustics since 2010. He tests various complex systems, including wind turbines and components, microphones, headsets, and hearing devices. At Demant, Bertrand is part of a team composed of a scrum master, a product owner, developers, and audiologists, focusing on developing and testing DSP and audiological features for hearing aids.

Testing features for hearing aids can be quite complex. Bertrand's daily challenge is to maintain a holistic view of the different features the team is working on, enabling him to create, update, automate, and execute tests that support the team. He emphasises, "This requires a solid understanding of a system that integrates various fields such as signal processing, audiology, electroacoustics, software, and hardware."

Bertrand's team is currently working on a feature related to feedback management. This feature incorporates multiple strategies to control feedback levels. One approach involves suppressing unwanted acoustic signals that feed back from the receiver to the microphones. To work effectively, this approach requires an accurate representation of the acoustic feedback loop. Bertrand clarifies, "Most of the development tests related to this feature are conducted on a HATS with the assistance of a robot. We use HATS because it offers a realistic reproduction of the acoustic environment around the device, and the robot helps facilitate changes in the acoustic feedback loop."

> "WE CHOOSE HBK BECAUSE THE PRODUCTS YOU PROVIDE ARE ROBUST AND RELIABLE. YOU PROVIDE A WIDE RANGE OF SOLUTIONS THAT FIT OUR NEEDS.
>
> *Bertrand Smits, System Test Engineer, Demant*

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