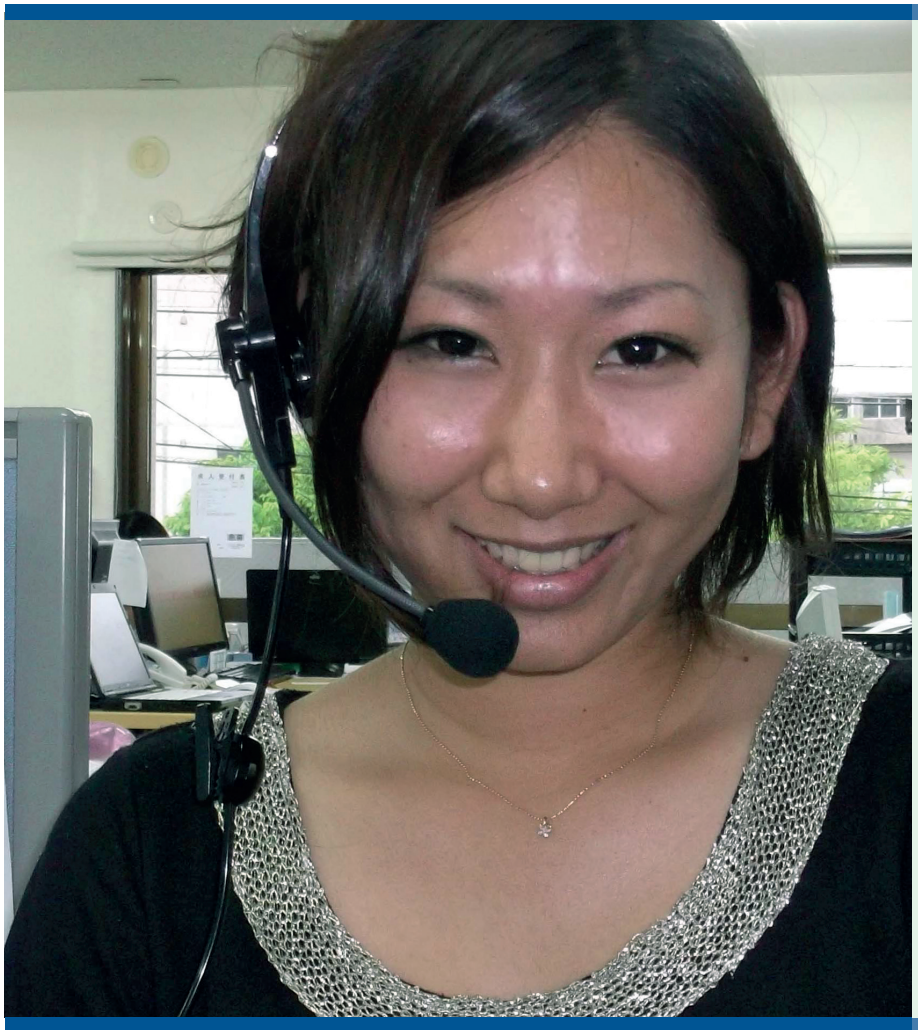
Brüel & Kjær
BEYOND MEASURE

INVESTIGATING HEARING LOSS AT CALL CENTRES

Hearing loss at call centres is a major issue, from exposure to excessive and continuous high levels of noise. Using the latest technology, Professor Setsuo Maeda of Kinki University, Japan, has investigated the noise exposure risks and speech intelligibility of traditional headsets, and the latest bone-conducting devices.

KINKI UNIVERSITY



CHALLENGE

Investigate the causes of hearing damage in call centre workers, and the mitigation options

SOLUTION

Analyzing the exposure of call centre workers using HATS and personal noise dose meters

RESULTS

Dr Maeda found some hearing sensitivity differences before and after the workers' shifts

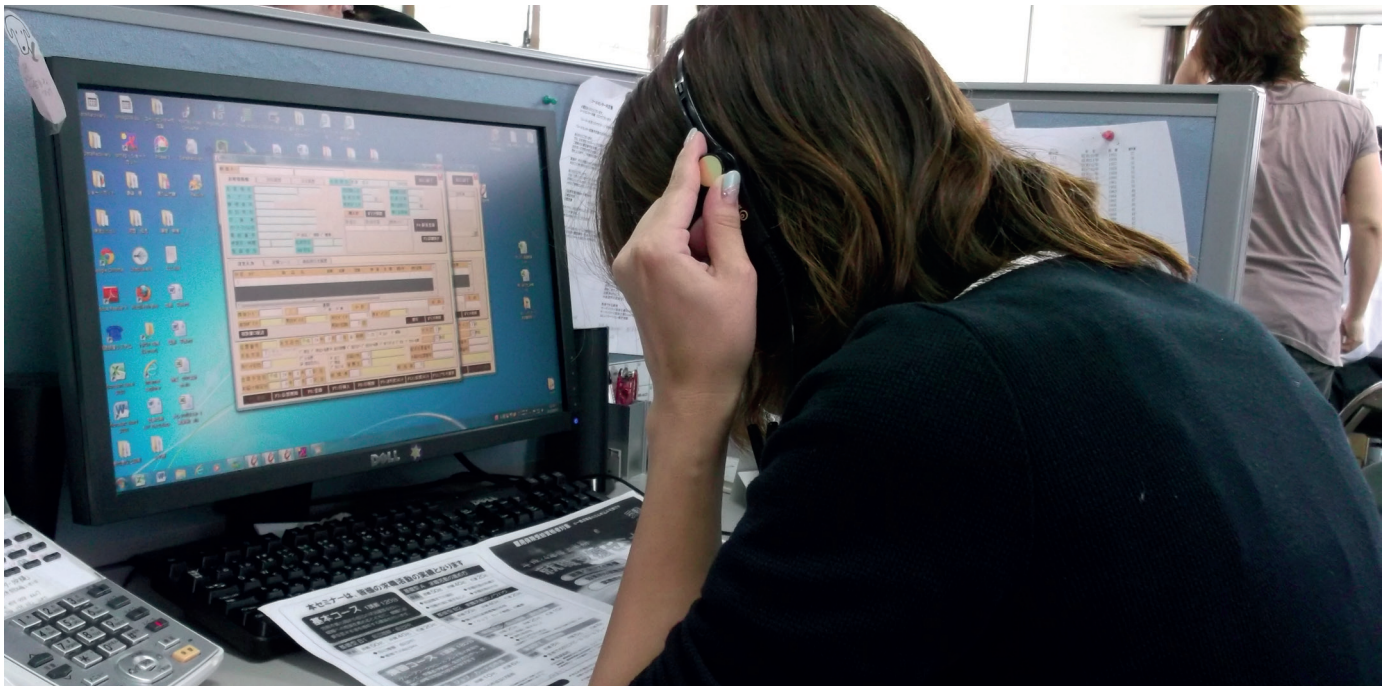
"I CAN CATEGORICALLY STATE THAT HIGH BACKGROUND NOISE LEVELS IN CALL CENTRES DO CAUSE HEARING LOSS."

Dr Setsuo Maeda

The call centre

The tests were carried out at an Okinawa call centre which employs ten people – eight women and two men.

Call centres such as this mostly use headsets with only one earphone so that users can still communicate with other workers.



One of the causes of hearing loss in call centres is acoustic shock – a sudden and unexpected burst of high-frequency noise

BACKGROUND

Noise-induced hearing loss is the second most common occupational disease, reducing the quality of life for millions of people who suffer from it. Loud machinery, equipment or vehicles have always been considered the main culprits for noise-induced hearing loss, but these are to a great extent controlled by rules, regulations and careful monitoring. However, we sometimes expose ourselves to excessive noise levels without even realizing it, and in the least expected of places.

A call centre environment can be loud – periodically or consistently – causing concerns for the health of their workers. For years it was believed that being a call centre operator was a low-risk occupation, but personal injury claims by call centre workers are increasing. These include repetitive strain injury, eyesight and posture problems, transient balance disorder, tinnitus and noise-induced hearing loss.

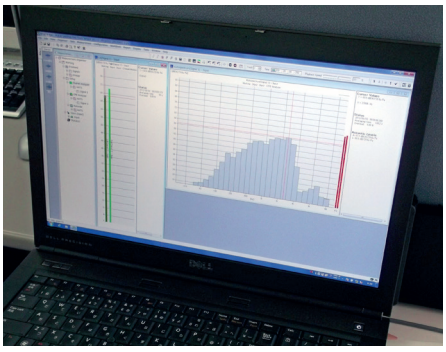
The EU has published a Directive but this has not been implemented globally, so there is a high number of court cases and claims for compensation. In Japan, there are guidelines, but no laws. A paper on this subject was presented at the Japan Hygiene Association Conference in November 2012.

CHALLENGE

Dr Setsuo Maeda, Dr.Eng., Dr.Med.Sci. is Professor of Human Vibration at Kinki University, Osaka, Japan. Dr Maeda conducted research to compare the use of conventional headsets with bone-conducting devices, and to evaluate whether bone-conducting devices reduce the risk of temporary or permanent hearing loss.

Dr Maeda also carried out research into speech intelligibility using bone-conducting headsets, where he compared speech intelligibility between a normal headphone and a bone-conducting device using RASTI (Room Acoustical Speech Transmission Index) signals.

One of the main causes of hearing damage in a call centre is acoustic shock, which occurs



The HATS was used in parallel with workers making real calls, so the incoming call signal from the telephone was divided between two headsets

when a sudden and unexpected burst of high-frequency noise is transmitted through the operator's headset.

SOLUTION

Dr Maeda conducted laboratory experiments using HATS and PULSE in which he compared normal headphones with bone-conducting headsets using white noise. Then, he assessed the experience of the actual workers making calls. The incoming call signal from the telephone was divided between two headsets, with the extra one working in parallel, on a Head and Torso Simulator (HATS). Dr Maeda measured the hearing sensitivity of the staff eight hours before the test and eight hours afterwards.

RESULTS

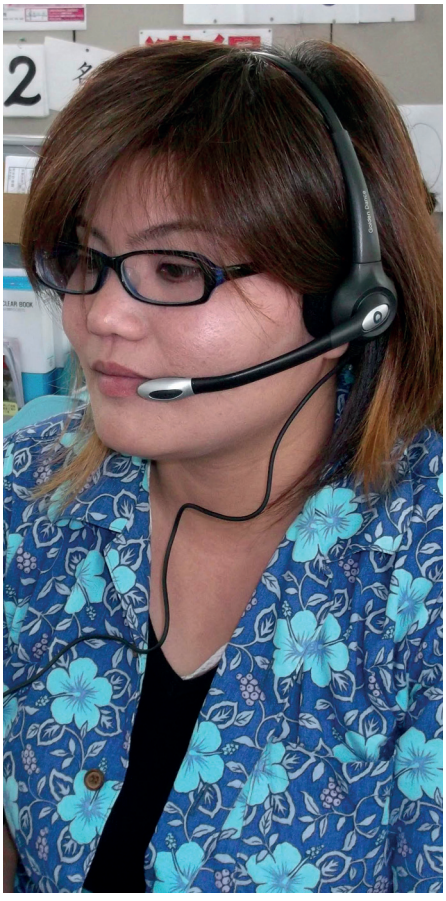
Dr Maeda found that there was some reduction in hearing sensitivity between the two times that he measured the hearing sensitivity of the call centre staff.

The normal frequency range of the sound to which a call centre operator is exposed is between 300 Hz and 4 kHz. In terms of sound pressure level, Dr Maeda found that the results ranged between 61.7 dB(A) and 77.6 dB(A), while the average background noise was measured at 58 dB(A).

An area of concern was acoustic shock. "Acoustic shock is a major concern as each operator has individual control of the sound level, but there is no automatic maximum limit. Therefore my recommendation would be to use a filter or shut off to limit the maximum noise level exposure," continues Dr Maeda.

"My conclusion is that hearing damage could occur at levels above 90 dB(A)," says Dr Maeda.

Speech intelligibility is apparently not an issue when background noise is low, but becomes a more obvious issue when background noise levels increase. He found that the bone-conducting device did not adversely affect speech intelligibility.



A bone-conducting headset in use at the Okinawa call centre

CONCLUSION

"From my interviews with the test subjects it is clear that hearing loss is a concern," says Dr Maeda. "However, the management and workers at this call centre were pleased with the results because the levels recorded were significantly below danger levels," says Dr Maeda. "However, a factor in the working practices of call centres is the exposure window – in other words those workers exposed to higher noise levels should work for a shorter time."

According to Dr Maeda, however, "The call centre where we carried out the tests is small and noticeably quieter than the large, international call centres that employ hundreds of people. In fact, the largest call centre in Okinawa employs 3000 people, making these workplaces potentially much louder than the test call centre.

"I can categorically state that high background noise levels in call centres do cause hearing loss," says Dr Maeda, "and some call centres, especially those dealing with customer complaints, are exposed to one other important issue – stress."

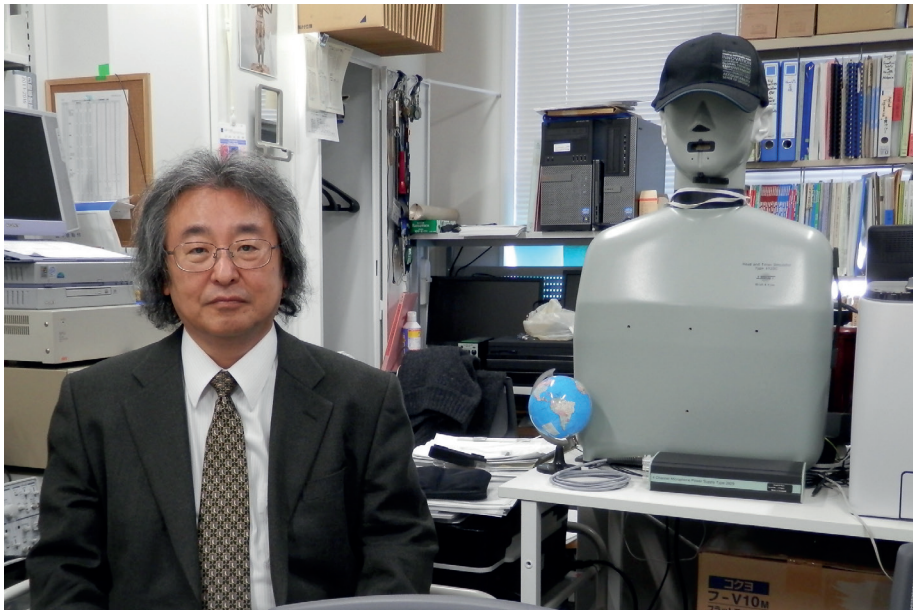
"In my opinion," continues Dr Maeda, "employers should provide noise prevention measures to protect call centre workers."

Dr Maeda believes that bone-conducting devices help to prevent hearing loss. This has also been confirmed by studies carried out at the University of Southampton in the UK.

Brüel & Kjær equipment

"PULSE was so easy and quick to set up and it was a simple matter to make a PULSE template," explains Dr Maeda. "I saved all the test data on the hard drive of my PC. Software used included Time Data Recording Type 7708 and PULSE LabShop Type 7700. I displayed CPB and overall levels. I also used Brüel & Kjær's Sound Quality Software Type 7698 for further analysis."

> "FROM MY INTERVIEWS WITH THE TEST SUBJECTS IT IS CLEAR THAT HEARING LOSS IS A CONCERN."
>
> *Dr Setsuo Maeda*



Dr Setsuo Maeda, Dr.Eng., Dr.Med.Sci. spends 70% of his time teaching undergraduate and graduate students and the other 30% conducting research with a special focus on issues that connect his scientific and medical expertise

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