




Industrial earplug fit testing device




Email: grszc@ciop.pl
 Grzegorz SZCZEPAŃSKI, Ewa CHOJNOWSKA, Leszek MORZYŃSKI, Emil KOZŁOWSKI, Rafał MŁYŃSKI

CIOP  



Seoul International Invention Fair – SIIF 2025, 03-06 December



Problem with the noise



Region	Approx. Exposure to Noise at Work	Source
Poland	~50% people worked under hazardous noise conditions	Statistic of Poland 2025
Europe (EU)	About 28% of workers in 36 European countries reported being exposed to “excessive noise” for $\geq \frac{1}{4}$ of their working hours.	Major survey: 6th European Working Conditions Survey (EWCS 2015); EU-OSHA reviews
Asia	30–50% of workers in certain Asian countries/industries are exposed to noise levels exceeding 90 dB(A) (e.g., heavy industry, manufacturing).	Review of Asian occupational-health studies, roughly 2010–2020
South Korea	In many workplaces noise levels hover around or exceed 85–90 dB(A) (legal exposure limit in Korea is 90 dB(A)). Noise is among the main occupational hazards in industry.	National studies and reports (e.g., from KOSHA), data roughly 1990–2010+

CIOP  



Commonly used solution - earplugs




Advantage	Disadvantage
They are cheap and effective	They are effective provided that they are correctly positioned

CIOP  

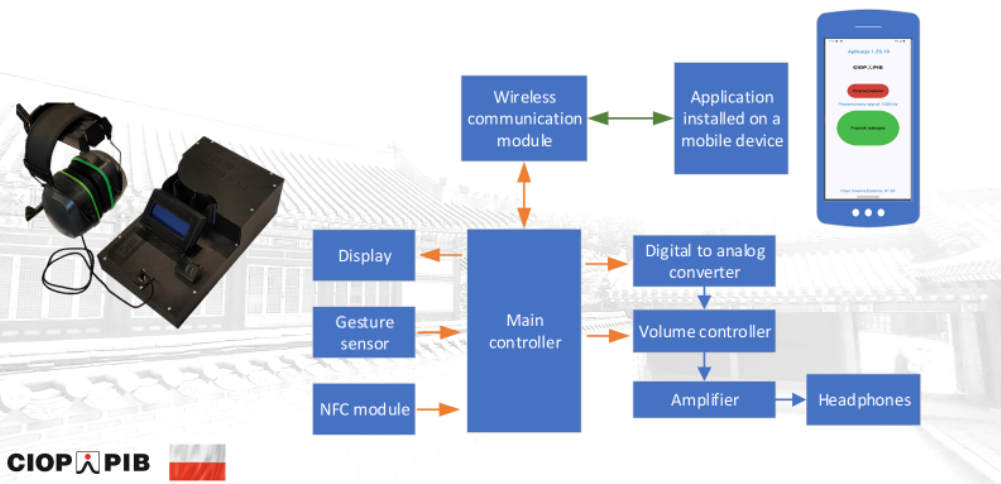
The essence of the invention



The **essence of the invention** is based on measuring the user's hearing threshold before and after the insertion of hearing protection earplugs into the ear canals. The obtained results make it possible to determine the actual attenuation performance of the earplugs and to compare it with the values declared by the manufacturer, thereby enabling an assessment of the correctness of the earplug fitting.



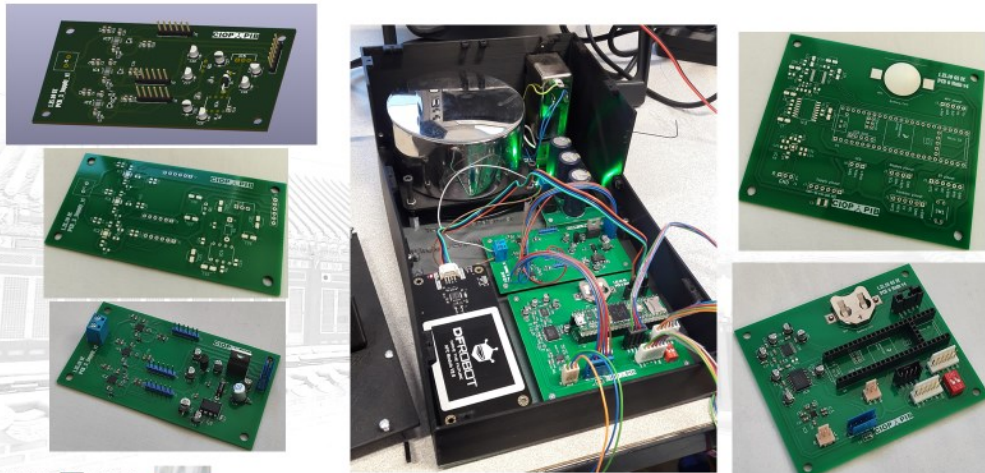
Diagram of the invention



Prototyping 3rd stage



Prototyping actual (4th) stage



Mobile app



Conclusions



The implementation of the invention improves the accuracy and reliability of assessing the effectiveness of hearing protection devices. By enabling objective verification of earplug fit and attenuation performance, it contributes to a significant reduction in the risk of hearing damage among workers exposed to high noise levels.

The application of the invention is relevant to industrial sectors where workers are exposed to high levels of noise, such as manufacturing, construction, mining, and metallurgy. Its use enables effective monitoring and control of hearing protection performance, supporting the maintenance of safe working conditions and helping to prevent long-term hearing damage among employees.

The innovative aspect of the invention lies in the integration of daily hearing threshold measurement with the functionality of testing the correct use of hearing protection earplugs. Another novel feature is the implementation of a contactless operation method, which is particularly important in situations involving an increased risk of infectious disease transmission.

The commercialization stage of the invention involves final model testing, aimed at refining its functionality prior to market implementation.

Industrial earplug fit testing device

Email: grszc@ciop.pl

Grzegorz SZCZEPAŃSKI, Ewa CHOJNOWSKA, Leszek
MORZYŃSKI, Emil KOZŁOWSKI, Rafał MŁYŃSKI



Thank you!