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Validation of Occupational Noise Measurements in a Mechanical Workshop

CASE STUDY: Using SVANTEK SV 104 Smart Dosimeters for Accurate Exposure Assessment According to ISO 9612

Measurement Operator:

SVANTEK Consultants

Measurement Equipment:
SVANTEK SV 104
Personal Sound Exposure Meter

Challenge:
Distortions in occupational noise measurements caused by worker behavior and non-occupational sound sources.

Occupational Noise Case Study

This case study presents the validation of daily occupational noise exposure measurements in a mechanical workshop using two **SVANTEK SV 104** dosimeters mounted on both shoulders of a worker. The measurements were carried out according to ISO 9612, taking into account potential disturbances such as:

Loud music simulating non-occupational noise sources,	Manipulated positioning of the dosimeter near noise sources (e.g., placing it directly on a CNC machine),	Accidental bumps of the microphone against hard surfaces.

Accurate measurement of occupational noise exposure is a critical component of any effective hearing conservation strategy. Occupational noise measurements aim to determine the actual sound levels employees are exposed to during their work duties. These measurements provide data that go beyond simple sound level readings — they offer insight into when, where, and how workers may be at risk of noise-induced hearing loss (NIHL). Personal noise dosimeters, such as the **SVANTEK SV 104**, are worn throughout the workday and record time-weighted average noise levels (TWA), peak levels, and cumulative noise doses. When combined with spectral analysis, motion detection, and audio event logging, these instruments provide a powerful means of identifying and eliminating distortions that could otherwise lead to inaccurate exposure assessments.

Conducting these measurements is essential not only for compliance with occupational safety regulations, such as those defined by ISO 9612, OSHA, or the EU Noise Directive, but also for preventing permanent hearing damage. By understanding the actual noise conditions in the workplace, employers can make informed decisions regarding engineering controls, administrative changes, and personal protective equipment. In dynamic environments like workshops—where workers operate CNC machines, grinders, and saws—noise levels can vary significantly throughout the day. As such, precise and continuous measurement is the foundation for identifying high-risk situations and implementing preventive measures tailored to real working conditions.

"Smart dosimeters like the SV 104 don't just measure noise—they reveal the real story behind the data. By combining audio logging, frequency analysis, and motion detection, we can separate true occupational exposure from misleading artifacts, ensuring every decision is based on accurate information."
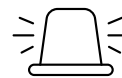
Marek Podgórski,
Noise & Vibration Expert

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Smart Functionality of the SV 104

The **SV 104** personal sound exposure meter offers advanced features beyond standard LA$_{eq}$ logging:
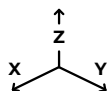

1/1 octave band spectrum logging,

Event-triggered or continuous audio recording,

Integrated triaxial accelerometer for detecting mechanical shocks,

Motion detection for identifying stationary periods (e.g., when the dosimeter is removed).

These capabilities enable the identification and exclusion of distorted measurement segments, leading to a more accurate evaluation of the worker's true noise exposure.

In this study, the use of advanced features in the **SV 104** dosimeters—such as spectral logging, vibration detection, and audio recording—allowed for detailed verification of the measurement integrity. These tools enabled the identification of distortions caused by external factors, which, if not accounted for, would have significantly overestimated the actual occupational noise exposure. The analysis and corrections performed through **SVANTEK Supervisor** software revealed how much of the recorded exposure was attributed to non-occupational events, confirming the importance of accurate noise measurements for reliable risk assessment and hearing loss prevention.
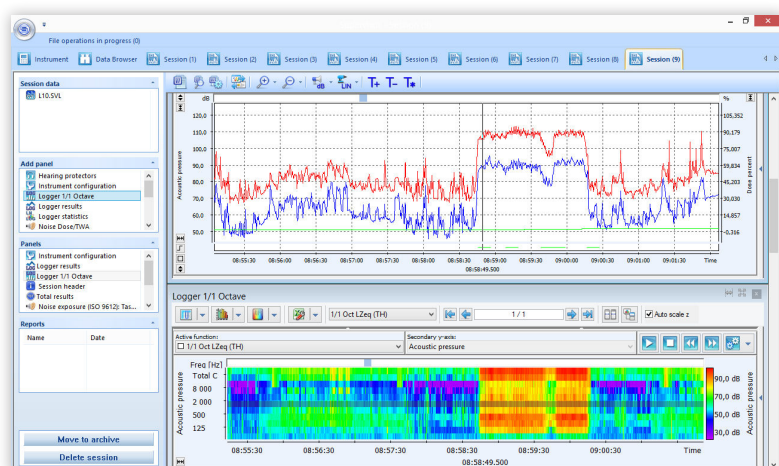
Time history of LA$_{eq}$ and LC$_{peak}$ together with a spectrogram of a loud music event, left shoulder instrument.
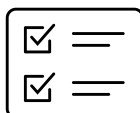
Measurement Results and Distortion Identification

Total Measurement Time:
7 hours 13 minutes

Initial LEX,8h (with distortions):
85.7 dBA = 106% of the allowed daily dose

Identified Distortions:

Loud music:
1.3% of the dose

No movement
(instrument parked on CNC):
13.7%

Microphone bumps:
87.6%

Corrected Exposure Value (After Eliminating Distortions):

LEX,8h = 71.3 dBA (4.3% of the allowed daily dose)

Conclusion

Smart dosimeters like the **SVANTEK SV 104** — equipped with audio logging, frequency analysis, and motion sensors — make it possible to detect and correct for artifacts in occupational noise measurements. In the case under consideration, most of the excess dose was caused by distortions rather than true exposure. Accurate identification and elimination of such events is essential for reliable workplace noise assessments, regulatory compliance, and long-term hearing conservation.

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