


HOW TO GET RID OF HEARING PROTECTION DEVICES

Is it humane to have people work in premises with unnecessarily high noise levels that put their hearing at risk – particularly now that **there are reasonable solutions to the problem?**

Oatly, a non-milk dairy, achieved a **healthier, more efficient** workplace where hearing protection devices are now just an unpleasant memory. **A wall-to-wall acoustic ceiling and wall absorbers solved the problem.**



Food manufacturer Oatly in southern Sweden realised that the noise levels from the factory's machines and conveyor belts needed to be reduced. Employees had complained about the loud noise levels in the packing room, and were having trouble relaxing and resting after work. Some showed symptoms of insomnia. However, hearing protection devices obstructed communication and posed a safety risk.

Wall-to-wall acoustic ceiling – the only right solution

"We concluded that effective sound

absorption would reduce the noise enough," says factory manager Benny Wraae. "But several alternative sound-absorbing solutions were proposed, such as ceiling-mounted baffles, free-hanging ceiling islands and a wall-to-wall acoustic ceiling complete with wall absorbers. As a food manufacturer, we have to meet strict hygiene standards. The sound absorbers mustn't collect dust or spread fibres, they must be resistant to bacterial growth, and they must be cleanable.

"For this reason, a wall-to-wall acoustic ceiling was found to be the only right solution. Combined with

the wall absorbers, this solution also produced the best acoustic values. We achieved acceptable noise levels and eliminated the need for hearing protection devices."

Target: under 80 dB

"And not least," adds Benny, "the noise levels dropped below an average 80 dB(A), the level considered harmful to hearing. That was our target. Can it get any better?"

After the sound absorbers were installed, employees were asked to comment on the results. The response was highly positive. Employees now

find it easier to communicate with each other, and are relieved not to have to use protection devices. It is also easier to hear the machines and determine where noises come from. Last but not least, the employees no longer feel tired.



As an extra measure to improve acoustics in particularly noisy parts of the room, wall absorbers were installed in the space between the long wall and machines. The absorbers were positioned at head height and mounted in a grid to protect against mechanical damage. The purpose of the absorbers is to reduce high noise levels caused by multiple reflections between the wall and machinery.



"What a relief not having to wear hearing protectors. They were heavy and strained my neck," says Annika Engström Håkansson, a machine operator at Oatly.

"The employees also find it much easier to communicate with each other now," says factory manager Benny Wraae.

Risk of hearing damage at 80 dB

Under international regulations, employers are obliged to ensure that employees use hearing protection devices, and must prepare an action plan to reduce noise if the equivalent noise exposure level is at least 85 dB(A). However, research shows that the risk of hearing damage increases considerably even at 80 dB(A). In the food and beverage industry in particular, noise levels are far too high and need to be controlled.



A wall-to-wall acoustic ceiling and wall absorbers on parts of three walls reduced the noise level by the 5 dB necessary to eliminate hearing protection devices.

Some spontaneous feedback from employees after the acoustics were adjusted:

- It's easier to hear what's being said
- It's easier to perceive where the sound is coming from
- It's a relief not to have to use hearing protection devices
- I'm less tired when I get home, I sleep better

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Acoustic systems from Ecophon

Ecophon Hygiene Performance™ A C3

Ecophon Hygiene Advance™ Protection C3

The room acoustic measurements at Oatly

The room acoustic measurements performed at Oatly focused on objectively defining the changes in sound level and speech perception in the premises after adjusting the acoustics. Table 1 shows the room acoustic parameters that were measured.

Summary of room acoustic measurements before and after adjusting the acoustics

Table 2 shows the average value of the room acoustic measurements for octave bands 500 and 1000 Hz before and after the acoustics were adjusted. According to the standard ISO 3382-1, the average measurement value for these octave bands is suitable for use as representative values.

Results

Table 2 shows that after adjusting the acoustics, the noise level (general noise) in the room had decreased by approximately 5 dB. According to previous measurements, the general noise level was approximately 81

to 84 dB(A) before the adjustment. After the adjustment, the general noise level had dropped to approximately 77 dB(A), bringing the noise levels below the limit values specified by the Swedish Work Environment Authority (Arbetsmiljöverket) (AFS 2005:16).

The speech clarity values also show a clear improvement. One reason for this is a reduction in the effects of delayed reflections in the room. This is also shown by a significant decline in reverberation times.

The noise level is still over 80 dB(A) close to certain machines. This is because the sound is dominated by direct noise from the machines. The direct sound is not affected by the ceiling and wall absorbers. Instead, it must be controlled through adjustments made directly at the noise source, such as installation of enclosures or screens.

Table 1

Property	Measurement	Designation	Definition
Reverberation	EDT, T20	Early decay time (s), Reverberation time (s)	Measures the reverberation (echo) in the room. The shorter the reverberation time, the more muted the noise in the room.
Speech clarity	C ₅₀ , D, RASTI	Speech clarity (dB), Definition (%), RASTI	Measures how clearly speech is perceived in the room. The higher the measured value, the better the speech clarity.
Noise level	Noise level reduction	ΔL (dB)	Indicates how much the general noise level in the room has been reduced.

Table 2

Property	Measurement	Before adjustment	After adjustment
Reverberation	EDT (s)	2.4 s	0.63 s
	T20 (s)	2.4 s	0.62 s
Noise level reduction	ΔL (dB)	-2.4 s	5 dB
Speech clarity	C ₅₀ (dB)	-2.9 dB	3.7 dB
	D (%)	34 %	70 %
	RASTI	0.47 (poor/fair)	0.70 (good)

Photo: Ole Jais



Facts Oatly

Oatly, located outside Landskrona in southern Sweden, develops, manufactures and markets health-oriented products based on a patented oat drink.

The products are based on research at Lund University. In 1963, Arne Dahlkvist, a professor at the University, discovered the factors that cause lactose intolerance. Over the years, in collaboration with colleagues and industrial players, Dahlkvist developed a technology whereby the products can be given a consistency similar to milk, making them suitable for drinking and cooking.

Oatly products are popular among people with lactose intolerance, and are increasingly favoured by all consumers who want to increase their fibre intake and eat healthier. Oatly has almost 50 employees and sales throughout much of Europe. The company also has operations in other parts of the world. For example, China shows potential for becoming a successful market.

Pregnant women must not be exposed to excessive noise levels

According to the Swedish Work Environment Authority, employers must perform a risk assessment for pregnant women who may be exposed to workplace noise levels exceeding approximately 85 dB(A) on a daily basis.

This means that pregnant women must not enter working environments where hearing protection devices are required, particularly in the later stages of pregnancy (from at least week 26 of pregnancy), when the foetus's hearing organs are developing. Moreover, high noise levels cause stress that can lead to tiredness and high blood pressure and restrict blood flow in the placenta.

Failure to comply with these regulations is punishable by fine. The regulations follow EU directives (European Agency for Safety and Health at Work).

