SRL
Acoustics | Noise | Vibration

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Acoustic News

Absorption design

The previous two issues have looked at the why and the what of absorption. Here we look at how. While it often does the job in a normal-sized office, there is more to acoustic absorption than a 600mm ceiling tile.

A space's acoustic environment is as unique as its aesthetics. Sure, we all know the 10m^2 private office and the 20m^2 shared office. What about classrooms, atria, lecture theatres and open plan living areas? These spaces all have different acoustic needs, and therefore different types and amounts of acoustically absorbent products.

Acoustic absorption products can be expensive. To get the best value for money, the exact type and placement of absorption is best done by an experienced acoustician.

Check your space

How do you choose what products will work best? Start by looking at the following properties of your space:

- its intended use(s)
- noise sources (inside and outside)
- shape and size

Let's use a teaching space and an atrium as two examples.

Intended use(s)

If the space will be used for teaching then you probably need lots of absorption at speech frequencies to help speech intelligibility. Ceiling tiles and wall panels (porous absorbers) will probably work best.

If the space is an atrium, then speech intelligibility is important at the reception desk, but likely not anywhere else. Is there a "quiet lounge" and a cafeteria? You will need to treat these uses differently in the same space.

Noise sources

Looking deeper at the teaching space, you need to know if it will be a lecture-style room, or a collaborative teaching room. Additionally, will the lecturer be amplified or not?

If the lecturer is amplified then make the space as acoustically dead as possible. Reflections "muddy" the sound and make speech less intelligible. Remember that often people in lecture halls are trying to understand their 2nd or 3rd language. They need clear speech.

If there is no amplification, then concentrate the absorption to the rear two-thirds of the room, leaving the front third reflective. Try to angle the front walls 10° from each other to prevent flutter echoes and project the lecturer's voice to the seats.

If the space is a classroom with collaborative teaching, then spread the absorption evenly. Just remember to make any wall panels resistant to damage; perforated hardwood above 1.5m is probably your best bet.

In atria you need low- and high-frequency absorption. Low frequency absorbers will help soften the buses and trucks on the roads outside. Use deep cavity perforated plasterboard and timber. Large expanses at high level are only seen by designers—no one else looks up—but are experienced by everyone who walks from a noisy exterior to a quiet, calm atrium.

Porous absorbers work well at mid to high frequencies, cavity absorbers are best at low frequencies

With the current trend of open plan offices linked to atria, this absorption is crucial not only for the atria, but also for the offices. If you are designing open plan office space leading off the atrium, you will need specialist advice, and a client who totally buys in to the concept.

Now add in porous absorbers where people are the main noise source (reception desks, walkway ceilings, lounges, lobbies) and you are getting a balanced acoustic environment, tuned to its noise sources.

Shape and size

Avoid curves and parallel, hard walls. These cause noise "focusing" and flutter echoes, which are annoying and reduce speech intelligibility in teaching spaces. If you want a curve, make sure its focal point is outside the room, or that it is completely covered in a porous absorber. Angle reflective walls at 10° to each other, or again cover in absorption. Perforated plasterboard often works poorly here as there are large expanses of "non-perforation".

SRL: specialist advice

Get the best value out of your acoustic absorption by using the right products in the right places for the right reasons. We can help you with that.