Timber Acoustic Solutions Overview

Combining carpentry expertise with acoustic knowledge to give designers maximum control over sound and aesthetics
Acoustic control and the warmth of real wood

The ultimate renewable material

The ultimate renewable material for architecture is also one of the oldest, and most attractive. Wood is solid, can be bent and shaped, is easily machined, and with the use of computer-aided design and CNC milling, timber is also continuously contemporary. These benefits make wood our preferred material for room acoustics solutions.

Extensive acoustic and design support for your project

When discussing acoustical requirements, you can expect the support of an experienced engineer. Our design team work on complex problem solving daily, and are well equipped to coordinate the process of integrating the concept with real-world challenges on site. Samples can be provided as well as project-specific drawings and specification guidance.
Slatted timber walls and ceilings

A solid White Oak slatted system for CIMA, London. These modular constructions make installation straightforward and the high open-area allow absorption to be augmented with an absorber behind the slats.

We offer comprehensive range of slatted timber systems. These are available for both walls and ceilings and offer extensive customisation to allow designers to integrate a solution which is perfect for their project. We are on hand to guide the technical details from specification through to installation, and

**Striking features which compliment many spaces**

Our slatted ceilings and walls enable the designer to introduce warmth and interest, with a very functional role. They integrate seamlessly into projects, and are designed to look as good as they do when installed, many years down the line. The modular nature of their construction makes installation accurate and fast, and also enables demounting for access to services, which can be effectively concealed behind. The range of finishes and size combinations are endless, and important considerations like durability and fire performance are addressed from the start.
Vertical slatted ceilings

You can specify your own slat sizes and spacings, or follow our guidance for a suitable system. Ceilings provide a large coverage area for absorption, and Class A acoustic performance is achievable.

Lighting is easily integrated, and services are hidden behind, with demountable systems providing excellent access. All finishing details and trims are also supplied by us, to the same factory finish.
Slated Walls

Feature walls with excellent functional performance. These systems are highly durable, highly customisable, and can hide services in the cavity behind.

Panels are mounted on secret fixing cross battens, with either fabric of glass tissue directly behind the slats. The same design can continue onto doors and desk fronts, and curve around bulkhead and openings.
Horizontal slatted ceilings

You can specify your own slat sizes and spacings, or follow our guidance for a suitable system. Ceilings provide a large coverage area for absorption, and Class A acoustic performance is achievable.

Lighting is easily integrated, and services are hidden behind, with demountable systems providing excellent access. All finishing details and trims are also supplied by us, to the same factory finish.
Custom design

We lead the market in our ability to provide custom solutions. Our in-house design team can take a concept and progress it whilst considering aesthetics, technical performance and budget. This has included various types of bespoke raft (see above Groove raft with integrated LiFi fittings and lights whilst still providing sound absorption), cupboard doors which turn the units into sound absorbers, through to fully geometric ceilings with all services integrated.
Groove panels provide an aesthetic sound absorbing finish for walls, ceilings and doors. Typically installed to battens in a tongue and groove fashion, this creates a seamless finish with the grooves running vertically or horizontally.

The panels work with a combination of Helmholtz from the perforated structure and porous absorption with mineral fibre behind the panels. You will see that there are a vast array of possibilities with these panels.
Groove examples

1. Groove 12 - White HPL 130
2. Groove 24-W - Walnut veneer
3. Groove R - White wash HPL
4. Groove 12 - Natural Walnut HPL
5. Groove 24-W - Oak veneer
6. Groove S-H - Walnut veneer
7. Groove 12 - Oak veneer
8. Groove R - ‘Manzano’ HPL
9. Groove S-H - “Black Mist” oil on Oak veneer
10. Hidden acoustic cupboard door - Groove R
11. Flexible panels - Groove R
Acoustic cupboard and sliding doors

Available for:
- Microperforated
- Nanoperforated
- Groove R
- Groove 12
- Groove 24
- Groove 5

It is now possible acoustic doors which match our ceiling and wall finishes. With the Groove and perforated panel range we are can provide this multi-function solutions, made to measure with holes milled for hinges and handles, and veneer edge band or ABS edging for HPL.

Not visible externally, the core of the panels have reinforced core boards which create rigid frames and allow for many types of hinges and handles.

Sliding doors can also be supplied and installed with simple top and bottom runners.

Above - cupboard doors are supplied with holes for hinges, pre-milled.
Below - Core board has solid frames for strength.
Perforated acoustic panels

Flexible systems for walls, ceilings and doors. The perforation patterns affect the acoustic performance and the makeup of the panels. Absorption ranges from Class C to Class B and finishes include HPL, veneer and plywood.

Please contact us to discuss the potential of these systems as applications included wall panels, grid mounted ceilings, rafts, cupboard doors, flexible panels and more. You will be surprised by the made-to-measure options...

1. 16/C Perforated Plywood
2. Nanoperf - oiled Oak veneer, Panel structure display
3. Micropert - oiled Oak veneer
4. Birch veneer ‘seamless’ perforated wall
Finish options

* Please note that images are for guidance only and variations will occur in natural timber products.

**HPL Wood effect**
- Hundreds of finishes
- Scratch resistant
- UV resistant
- FSC available
- Fire performance available

**HPL Colours**
- Hundreds of finishes
- Scratch resistant
- UV resistant
- FSC available
- Fire performance available

**Solid wood and veneer**
- Oil or lacquer finishing
- Match other joinery
- Stain options
- FSC available
- Fire performance available

**Coloured lacquer**
- RAL matching
- Match other joinery
- FSC available
- 10% to 50% sheen.
- Fire performance available

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**Solid timber and veneer with lacquer**

(C) - Expect colour variation between panels; (H) = Higher cost options; (V) = veneer only

- White Oak
- Whitewashed Oak (H)
- American Walnut (H)(V)
- Ash
- Birch rotary (V)
- White washed Larch
- American Cherry
- White Washed Ash (H)
- Siberian Larch
- Maple
- Oak - black stained (H)
- Red Cedar (C)

**Coloured oil on veneer**

A very natural and classic look. Currently for Groove and Perforated panels only.

- Pure Oak
- Fair White Oak
- Fair Oak
- Oak Gris
- Black Mist Oak
- Coffee Oak

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Coloured oil on veneer (continued)

HPL (not for slats)

These are the standard HPL (high pressure laminate) options. Many more are available and we can try to match finishes. The standard thickness is 0.9mm and these are highly scratch resistant, UV resistant, and low maintenance finishes.
High Pressure Laminates overview

Made with several layers of paper and resins pressed together under high pressure, the resulting sheet is of high quality and with excellent durability. Combining this technology with acoustic panels produces excellent solutions.

Timber effect

As well as the standard finishes overleaf, many more options are available. These are high quality finishes with complimentary texture.

Colours

A wide range of colours are available. Talk to us if you have specific NCS, RAL or Pantone requirements.

Textures

Each of the timber effect finishes has a pre-selected texture to best suit the character of the species it represents. Solid colours are usually a satin finish and on special request, Ultra Matt finishes are available as mentioned below.

New: Ultra Matt, anti-fingerprint HPL

A dramatic and contemporary look. Highly resistant to scratches and fingerprints, unlike other matt surfaces.

New: Printed HPL

Enables uniquely multifunctional solutions like sound absorbing cupboard doors with imagery, branding or signage; still maintaining the abrasion resistance of normal HPL.
Sound absorption in rooms

Reverberation time, $T_{60}$

Reverberation time is one of the key determinants of room acoustic quality, and the factor we try to control with our sound absorbing solutions. It is the time it takes for a sound to decay by 60 dB in a given space. It’s measured at individual frequencies, with certain frequency ranges given more importance due to the way we perceive sound, and the frequency spectrum of speech and/or other common sound sources. Often reverberation time is given as a single figure, which is based on these frequencies, and the function of the room will determine how short this time should be, with classrooms an example of a critical space due to the need for high speech intelligibility.

$$T_{60}$$

Sound pressure level, $L$ (dB)

Controlling reverberation

The principal method of reducing reverberant noise is to introduce sound absorbing surfaces, with more effective absorbers and greater coverage leading to lower reverberation times. The amount of sound energy a material will absorb is known as the absorption coefficient, and this again is measured across a frequency spectrum, with a system to give a single figure performance level, based on the most important frequency ranges.

### Predicting reverberation time

If we know the dimensions and the absorption characteristics of the finishes of a room, we can quite accurately predict the reverberation time. Wallace Clement Sabine, an American physicist who took the field of Architectural Acoustics from an art to an empirical science, developed a method of modelling this in the 1890’s which is still in use today. He also used his technique on the design of the Boston Symphony Hall, which remains one of the best of its kind in the world.

### Practical implications for designers

Typically, an acoustic consultant will assess the appropriate reverberation time for a room, and inform the designers that a certain amount of absorption, of a given minimum performance standard, should be installed to fulfil this. Usually the simplified performance, i.e. Class C, will be specified, and we can then suggest suitable solutions to meet the criterion, along with the designer’s aesthetic and functional requirements. The next section shows how we ensure sure the performance is met.

<table>
<thead>
<tr>
<th>Weighted absorption, $\alpha_w$</th>
<th>11654 Class</th>
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<tbody>
<tr>
<td>1.00 - 0.90</td>
<td>Class A</td>
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<tr>
<td>0.85 - 0.80</td>
<td>Class B</td>
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<tr>
<td>0.75 - 0.60</td>
<td>Class C</td>
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<tr>
<td>0.55 - 0.30</td>
<td>Class D</td>
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<tr>
<td>0.25 - 0.15</td>
<td>Class E</td>
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Absorption Performance of timber acoustic panels

In brief, we can improve the effectiveness of timber acoustic panels by

- increasing the open area (larger or more perforations/gaps between slats)
- adding an effective porous absorber behind the panels
- increasing the thickness of this absorber
- increasing the cavity behind the panels/absorber
- covering larger surfaces in the room (such as the ceiling)
- considering the Helmholtz resonance provided

Helmholtz resonant absorption

There is another absorption mechanism to timber acoustic panels, which can help us to improve the performance, without losing the look and functionality, desirable from timber panels. This is known as Helmholtz absorption, named after physicist and acoustics pioneer, Hermann von Helmholtz. Resonant absorption uses mass vibrating against a spring - in this case, the air in the perforation or between the slat is the mass, and the absorber behind provides the damping to remove sound energy.

Absorber thickness

The illustration above shows the relationship between absorber thickness and performance, and sound frequency. Maximum air movement is 1/4 wavelength from a hard surface, and the closer to this point an absorber sits, the higher the performance. Higher frequencies have shorter wavelengths, and so are easier to absorb as you require less thickness in the absorber. This explains why in order to achieve a Class A absorber, with reasonable absorption in the mid to low frequencies, you usually need a thickness of 35-50mm. This also explains why adding a cavity behind the absorber can increase low frequency performance, although as it doesn’t increase the mass of the absorber, the increase is limited.

Porous absorption

Porous absorbers are used behind our acoustic panels to aid performance. We look for an absorber with high tortuosity (complex structure), high porosity, and good density; such as 60kg/m³. Mineral fibre is ideal here, although more sustainable options are available which also work well.

Timber acoustic panels

Timber acoustic panels require additional consideration to achieve useful absorption. Unlike a bare mineral fibre panel, they also have the hard, reflective surface to the face from the timber itself. As follows then, reducing the amount of reflective surface, by increasing open area, gives better performance. This is particularly true in the high frequencies, as similar to light, the high frequencies don’t go around corners very well, where low frequencies can.

Predicting performance

We can measure the performance of acoustic panels in a laboratory with a reverberation chamber. When designing absorbers specific to a project, we often use simulation software to make a prediction of the performance. When using standard material such as mineral fibre behind the panels, this gives accurate results, allowing acousticians to then use the data to calculate the reverberation time a room will have.

Typical buildup

The illustration below shows a typical buildup for one of our slatted timber systems, with consideration of the factors discussed.
We also provide

Seamless acoustic spray ceiling finishes as seen here at Canto Corvino, London

Seamless acoustic plaster ceiling finishes as seen here at Mere, London

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room acoustics solutions

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