

MAID SERVICE

TORSTEN STEINBRECHER FROM QUALTRON DEDICATES THIS SPACE TO NEIL DAVIDSON OF C-ATS, WHO EXPLAINS THE ADVANCED AND PRACTICAL APPROACH TO THE CHALLENGES OF QUALITY SOUND ISOLATION ONBOARD SUPERYACHTS



Yacht Movie Theatre gets engineered acoustic design to minimise sound bleed.

Soundproofing the room can make the difference between a superb experience and having Aunt Martha pounding a broomstick on the kitchen floor from above yelling to keep the noise down.

Sound is what separates a true cinema experience from simply watching TV. A dedicated and fully engineered room with effortless dynamics, pumping bass and fully immersive surround sound is a visceral, emotional experience. These qualities which make the experience are also the biggest challenge in cinema design – delivering the experience only to those in the cinema and nowhere else.

There are two distinct elements to optimising cinema acoustic to ensure that the maximum performance can be delivered regardless of the choice of speaker system; Acoustic Treatment and Sound Isolation. The improvements provided by each system can be complementary but by taking a dedicated approach to each,

the best results can be achieved. In this article we will focus only on Sound Isolation.

Sound Isolation relates to the construction of the acoustic shell to maximise the attenuation between the cinema and surrounding spaces. We can tackle sound isolation by applying MAID – Mass, Air permeability, Isolation and Damping.

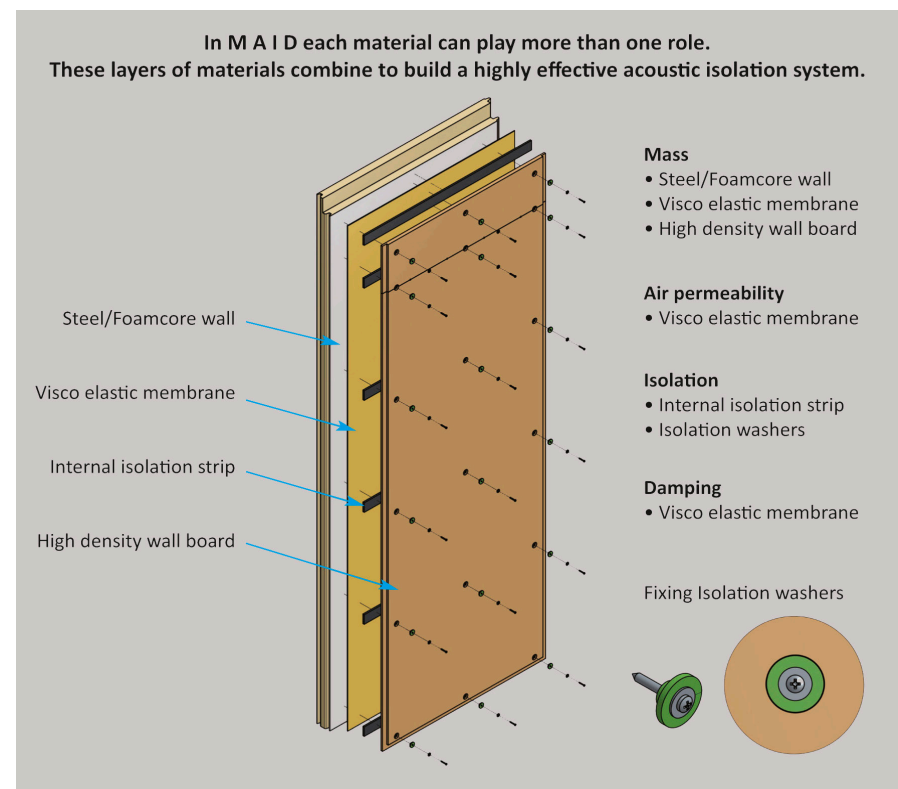
In Sound Isolation, it is important to dispel one myth at the earliest stage. Attenuating the level of sound transfer to a suitable level is our goal – completely preventing the leakage of sound from a high performance cinema is simply not possible making the choice of location very important. This difficulty is most apparent in bass notes

which have a long wavelength that is extremely difficult to contain.

Luckily for us, human hearing is much less sensitive to low frequency sounds and this is reflected in the standards used to describe the spectra of noise and in the assessment of isolation performance.

It is convenient to use single numbers to explain performance but in sound that can only ever be a starting point to the overall system design. Understanding noise and isolation ratings is an article all of its own however!

The M A I D framework gives us the four elements that we can address when



designing the optimal sound isolation solution. Let's look at these in turn.

Mass is simply the weight of the sound isolation structure. As the mass doubles, the transmission loss improves by 6dB. It is pretty intuitive that a massive and dense structure will block more sound than a light weight one, but this also implies that the structure will use a considerable available floorspace. It is therefore tempting to use a very dense material such as metal panels however the rigidity of these materials actually makes them a poor choice. The rigid material tends to vibrate more releasing much of the sound energy back into the space.

Air permeability is a critical factor. Just as water will find the tiniest crack and seep through it, so will sound energy. Any gaps in the sound isolation shell will greatly weaken the performance and only real attention to detail can ensure that they are blocked during construction.

Obvious problems come from items such as doors and windows but much more difficult to solve can be hidden flanking paths such as around duct work or cable penetrations. These tiny hidden flanking paths can cost as much as 10dB decrease in transmission loss so play a huge role in the end result.

Isolation is an often overlooked factor in cinema sound isolation. When you look at that giant subwoofer that will create a

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20Hz note at 115dB it should come as no surprise that the resulting sound wave has a huge amount of energy in it. When that energy hits the walls, floor and ceiling that energy needs to be converted to some other form – typically motion and heat – for it to be removed inaudibly.

That same energy however can easily be transferred into the structure at which point it can travel much further than when in air. By isolating the speakers so that they do not couple to anything in the space and isolating the walls, floor and ceiling from the structure you can prevent this transfer. It is much easier to contain the sound in air than it is if the sound couples with the structure.

Damping is our final element in the sound isolation framework. Heavy, rigid objects like metal panels, quickly release energy directing the sound both back towards the origin and outwards towards the rest of the vessel. The use of damping materials on these objects greatly reduces that tendency which results in a similar increase

in the transmission loss. An even greater performance can be achieved by layering materials of varying rigidity. Using a so-called limp mass material between two more rigid surfaces makes a tremendous improvement.

With the correct approach it is possible to deliver an isolation performance where any noise leaking from the cinema is reduced to that of the overall background noise of the vessel.

The MAID framework from Cinema Acoustic Treatment Systems can be used to optimise and improve almost any typical construction to deliver the best possible result.

To find out more about how C-ATS can enhance your onboard entertainment environment, please contact Qualtron.

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