

ACOUSTICS IN COMMERCIAL PROJECTS:

DESIGNING THE RIGHT ENVIRONMENT



INTRODUCTION

The acoustics of any environment have a profound impact on the functionality of the space and the health and wellbeing of its occupants. Over recent years many studies have unveiled the impacts of noise and the benefits of creating an acoustically pleasant space.¹ Dozens of academic papers show people who are exposed to even fairly modest levels of sound exhibit increased stress, irritability and loss of sleep and have found acoustics to influence productivity, absenteeism and the effectiveness of workplace collaboration.² In Australia, there is a growing awareness of the need to contain and reduce noise in order to enjoy a healthy life.³

As a natural by-product of economic growth, noise is bound to increase, calling for a greater focus on incorporating management techniques into designs.⁴ Acoustics are particularly important in commercial environments such as hospitals, offices, education, retail and hospitality, given the number of people who interact with them every day. Thoughtful design can reduce the impact of noise and improve the quality of our living environment⁵ but acoustic solutions must be employed in every stage of the design. Acoustics must be approached by designers and specifiers as a holistic challenge.⁶

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ACOUSTICS IN COMMERCIAL CONTEXT

Acoustics have a massive role in everyday wellbeing and can decide whether occupants of a building can effectively achieve tasks. The role of sound in the workplace is well documented. Research has proven an acoustically well-designed office favours concentration and effective communication. Noise in the workplace has a detrimental impact on stress levels and health, hindering employees from carrying out their work accurately and efficiently.⁷ One study identified a 66% drop in performance in a “memory for prose” task when participants were exposed to different types of background noise.⁸ In addition, employees working in relatively noisy environments have been observed changing their posture less frequently and noisier offices have been linked to more employee complaints and higher absenteeism, resulting from back pain and other musculoskeletal complaints.⁹

Modern healthcare design aims to build a healing environment, helping patients feel calmer and happier and reducing staff

stress levels.¹⁰ Research shows healthcare staff respond to noise with stress and reduced concentration, which contribute to a reduction in productivity as well as dissatisfaction. Noise pollution also increases the likelihood of mistakes and is a risk factor for staff burnout. The negative impacts of noise apply to patients as it can adversely affect their sleep, recovery and wellbeing. Lack of sleep leads to slower recovery times and greater likelihood of readmission to hospital.¹¹

Similarly, in an education environment, noise can lead to increased stress levels and decreased learning. Research in schools have found students struggle to understand teachers’ spoken instruction and absorb written information when they are exposed to excessive noise.¹² One study of primary schools in Spain, the Netherlands and the UK found that a 20dB increase in traffic or aircraft noise could delay a 9-10 year-old’s reading age by up to eight months.¹³



MANAGING NOISE

The acoustics of a space will depend on the structural and interior makeup of the building. Noise can be classified as either airborne noise – which travels through the air, generally through a direct or open path – and impact noise, which is generated by vibrations.¹⁴ The space's materiality and their sound absorbing qualities will dramatically impact on its acoustics. Ceilings, walls, floors, furnishings and the number of people occupying the space all have a part to play. It's also important to remember that humans have acoustic absorptive qualities and will impact on the sound perceived in a space.¹⁵

Sound can be managed using the ABC's of acoustics – Absorb, Block and Cover. Sound absorption is the ability of a surface to absorb sound and convert it into heat energy.¹⁶ A product with good sound absorption qualities will increase speech intelligibility and reduce the noise in an environment. Generally, products that are designed to absorb sound are soft, light and fluffy.¹⁷ Sound blocking products are designed to stop sound from entering, or leaving a space. They redirect the path of sound waves and are often heavy and dense.¹⁸ The final option is covering or masking sound, which involves adding sound to an environment to disguise the noise left behind.¹⁹ To effectively reduce or eliminate the problems of noise pollutions in a design, a combination of absorbing, blocking, and covering products must be used.²⁰

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DESIGNING ACOUSTICS IN COMMERCIAL ENVIRONMENTS

Designing acoustics needs to be approached as a holistic challenge that is considered early in the design process and revisited and managed throughout project. There is no one-size-fits-all solution when it comes to designing acoustics and a single product cannot be expected to create a desired acoustic environment. The final results will depend heavily on the integration of a range of quality systems as well as their installation. To limit the amount of noise intrusions, the BCA recommends use of a system of wall, floor, ceiling, bulkhead and riser systems which have been tested and documented.²¹

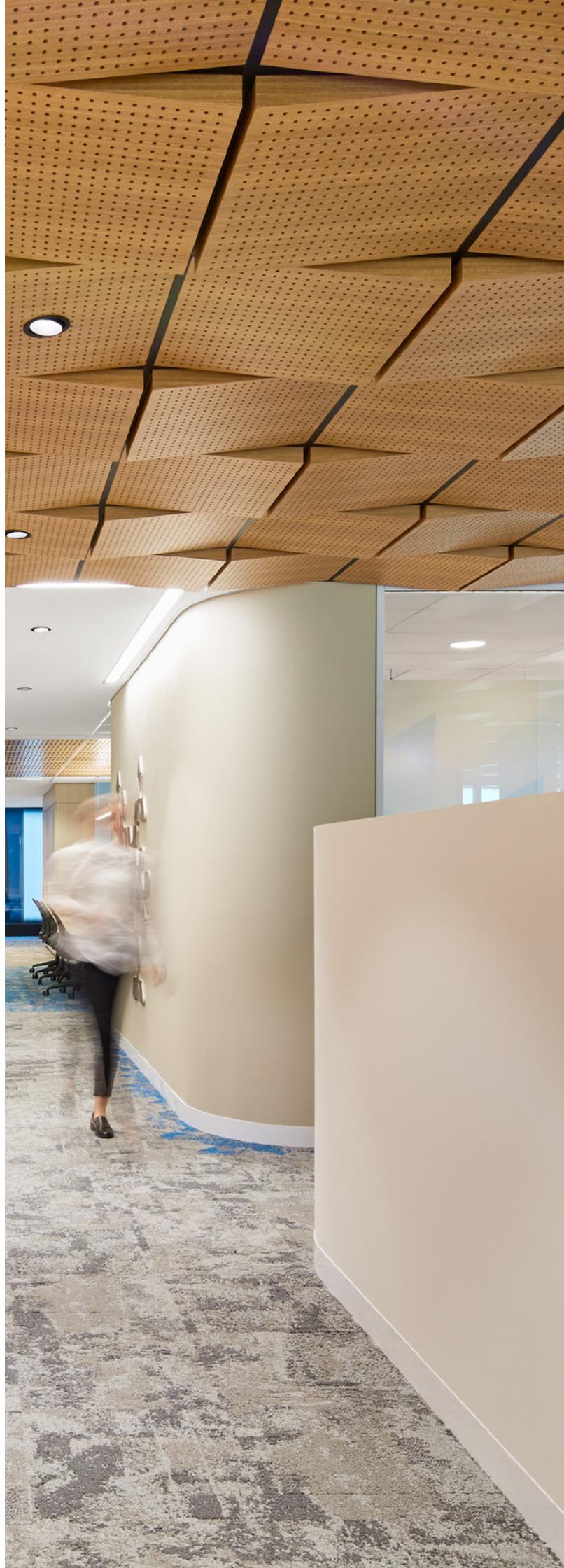
The most important consideration when designing the acoustics of a space is its use. A restaurant and a theatre will have differing acoustic needs and people will behave differently in each. For example, creating a restaurant with only blocking materials will reduce noise from outside the space, but amplify the sound within. The restaurant will be so noisy that speech will be unintelligible and can result in a negative customer experience.²²

Successful acoustical design is dependent on understanding the acoustical challenges of each individual space within its broader environment. It is not enough to understand an environment as simply an “office” or a “hospital”, as within each there will be environments with dramatically different requirements. For example, an office used as a call centre versus a bank will have vastly different needs for speech privacy. Within each environment there will be spaces which require more acoustical control, such as in conference rooms and executive offices. The key to an acoustically pleasant environment is attention to detail.

The dimensions and shape of a room will impact how sound is perceived due to reverberation sound, which is created when sound bounces off the surfaces of a room and back to the person hearing it. This means they hear the sound from its source, as well as when it's reflected. The shape of a room will affect the course of soundwaves and determine the rate and level in which it reaches a person's ears.²³

The layout of a building plan has a large role in the extent to which sounds impact on its users' wellbeing. It is good design practice to locate noise-sensitive spaces, such as patients' rooms, away from noisy areas. In addition, common noise environments should be grouped together and placed adjacent to each other, for example kitchens, laundries and bathrooms should share common walls, where possible.²⁴

To ensure a project achieves its maximum potential, engage an acoustic engineer and a professional ceiling and wall specialist early in the design process. This can help and avoid the need to tack on costly retrofit solutions which can negatively impact on the flow of a design.



CSR CEILECTOR

At the core of every successful project is a system of quality products sourced from a reputable supplier. CSR Ceilector is a producer of high quality acoustic solutions designed to meet the demands of any project. As an integral member of CSR's building products group, the company offers a dynamic portfolio of aesthetic and acoustic ceiling and wall panel products suitable for healthcare, education, commercial and retail/entertainment environments. CSR Ceilector delivers superior solutions through its global partnerships with OWA, Ecophon, Gyprock, Rondo, Troldekt, Daiken and Fricker.

CSR Ceilector's comprehensive product range allow building industry professionals to achieve a holistic acoustic solution that is simpler for all involved. Some of its products that not only enhance the acoustics of a design, but also improve the beauty of a design include:

Troldekt ceilings and wall panels

Troldekt is a classic acoustic panel suitable for use in a variety of different buildings. Available in four different structures and a wide range of colours, Troldekt Ceiling Tiles and Wall Panels can easily be integrated into any commercial or residential building space. Troldekt can provide a NRC of up to 0.95, dependent on its installation methods.

Ecophon Solo Panels

Ecophon Solo Panels are free hanging glasswool ceiling tiles that are available in a variety of shapes, sizes and colours. They provide high acoustic properties, 85% light reflectance, are 100% recyclable and come in a variety of shapes and sizes. It is an ideal solution when it is not possible to install a wall-to-wall ceiling and is suitable in buildings where the room volume could be maintained or as an option then TABS (Thermally Activated Building System) is selected as the cooling system. Ecophon Solo Panels offer a high degree of design possibilities both regarding colours and suspension systems.²⁵

Ceilector Timber

The Ceilector Timber collection is the widest range of ceiling tile, grid and accessories under one roof. The comprehensive range can be used to create a high-end, contemporary, sleek, timber finish in any room. Products are easy to install and available in a variety of perforations and materials. All panels are fitted with an acoustic fleece backing and can be easily installed into a regular ceiling grid system to achieve strong acoustic properties in any room. Ceilector Timber products achieve an NRC ranging from 0.55-0.70 and feature low VOC. There is a choice of drop in panels, batten panels, concealed panels and custom solutions. The wide selection of products ensures there is a solution to suit any budget or style with the option to customise veneers, sizes and perforations. Curving and bending is also available. The Ceilector Timber collection is paired with the technical and project support required for all types of applications including schools, healthcare, retail and offices as well as high-end, project specific requirements.

OWA Humancare

OWA Humancare is a mineral fibre ceiling tile that offers high acoustic properties with a 0.85 NRC and actively combats noroviruses and MRSA pathogens. This product has been specifically design to suit healthcare applications and the ceiling tile combines the highest standards for both purity and safety. The design of Humancare ceiling tiles have an organically simple, fleece-covered, smooth surface design, contributing to an extremely pleasant visual room ambiance.²⁶

In addition to providing Australia's widest range of ceiling systems and accessories, CSR Ceilector is committed to sustainable practices throughout its business. OWA Ceilings has achieved Ecospecifier Global Green Tag Level A certification, making the product eligible to provide credits towards a Green Star building and certified to contribute to Green Star ratings of Office Interiors, retail centres, education and healthcare buildings.²⁷

To find out how CSR Ceilector can provide a holistic acoustic and aesthetically pleasing solution to your project, visit www.ceilector.com.au.

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