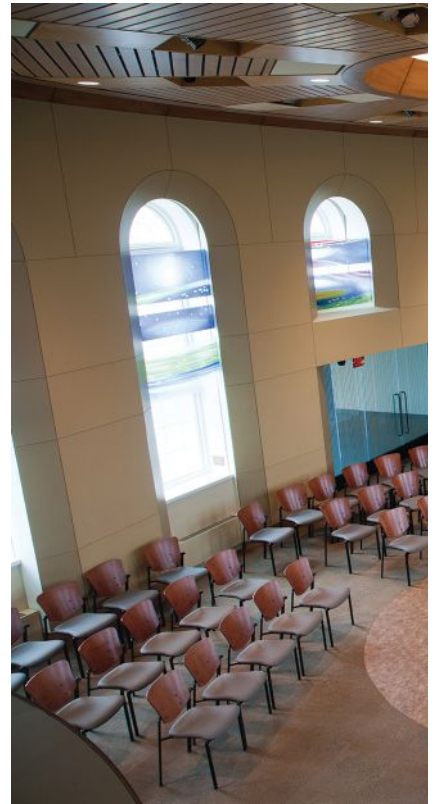


A SOUND POLICY >



↑ AURAL PREPARATION

Acoustics speaks to the size, shape, volume, and finish materials of a worship space. An architect and engineer must also take into consideration the type of services that will take place in a given space, as well as average and peak attendance. Shown here, Cornerstone Church, Caledonia, Mich.

Although some people think of acoustics and noise as having the same meaning, acoustic experts explain that acoustics is really the broad category of sound, usually “wanted” sound and its desired characteristics. Meanwhile, noise is unwanted sound, whether getting in or getting out.

“In the context of worship, I would define acoustics as the study of how natural and amplified sounds are generated and affected by the built environment to enhance or distract from

the worship experience,” says Kenric Van Wyk, president of the Indianapolis-based National Council of Acoustical Consultants. “Generally, acoustics speaks to the size, shape, volume, and finish materials of the worship space. Noise control is the study of the separation of distracting or competing sounds with the music or speech occurring in the worship space. Noise control generally refers to the reduction or isolation of exterior sounds such as road, rail, or airport, or interior sounds such as mechanical noise.”

There’s a great deal that architects and engineers must consider acoustically when designing a space. For instance, once inside the building, noise from congregants waiting in the lobby for the second service to start can spill into the worship space if the doors are not sealed. Some churches have youth groups that meet at the same time as the “regular” worship service and they need to be properly separated so that one doesn’t cause a distraction for the other. Even nurseries or cry rooms that are adjacent to the worship

ONCE YOU UNDERSTAND ACOUSTICS AND NOISE CONTROL IN THE CHURCH SETTING, YOU CAN EXECUTE BETTER SOUNDING DESIGN



◀ NOISE CONTROL

Worship spaces adjacent to nurseries or gathering spaces, for example, can fall prey to sound bleed through walls or windows—distracting worshippers. Yet another reason why design forethought is critical in achieving good sound. Shown here, Western Theological Seminary Chapel, Holland, Mich.

space can cause sound bleed through walls or windows—and become a distraction.

THE DETAILS OF SOUND

Alec Biccum, application specialist for Auralex Acoustics Inc. of Indianapolis, says that when discussing room acoustics and noise control, one very important distinction needs to be made from the start: the difference between inner room acoustics and what he likes to call “room-to-room” acoustics.

“One of the most common misconceptions out there is that if a room is well treated with acoustic paneling, it simultaneously ‘sound-proofs’ the room. However, this couldn’t be further from the truth,” he says. “Sound isolation (room-to-room acoustics) is a completely different way of looking at room acoustics than making the room itself a pleasing listening environment.”

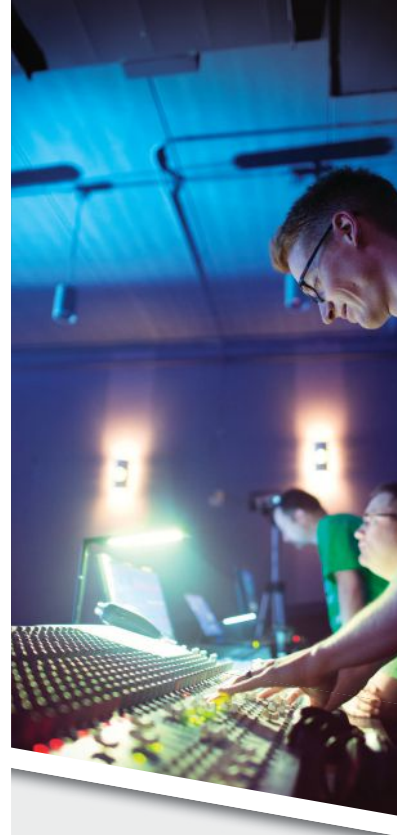
Good sound isolation is something that is best integrated with the construction process, but it could be executed retroactively, as well.

Treating inner room acoustics is far simpler since it is something that can be tailored to any existing space with the strategic use of the right products. In many instances, acoustic problems for a space can be easily predicted with enough information.

MAKING A PLAN

Nick Colleran, vice president of Acoustics First Corp. in Richmond, Va., says before undergoing any worship project, an architect and engineer must take into consideration the type of service plus

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“It does not matter how good a facility looks if the congregation cannot understand the message or gets a headache from trying to separate it from the noise or echo.”

NICK COLLERAN, VICE PRESIDENT, ACOUSTICS FIRST CORP., RICHMOND, VA

average and peak attendance, or else noise can be a problem.

“It will cost more later if they don’t consider acoustics first,” he says. “What is often seen in movies and on television is often not the source of what is being heard. It does not matter how good a facility looks if the congregation cannot understand the message or gets a headache from trying to separate it from the noise or echo. Often they do not know why it is that they don’t return every week.”

When designing for a project, Colleran says he plans for different reverberation times depending on whether its music or spoken word heavy.

“Low reverb enhances clarity. Higher reverb can hide flaws in music,” he says. “For amplified music, we’re generally designing a space for a reverberation time of 1 to 1.2 seconds. For traditional music, we would design a reverberation time more in the range of 1.5 to 1.7 seconds. For the spoken word, a shorter reverberation time of 1 to 1.2 seconds is generally preferable.”

Biccum says doors tend to have some sort of gap along their perimeter and may even lack the sort of density necessary to provide

the desired level of isolation. And although windows can do a lot to add to the aesthetic appeal of a space, they are very poor for both inner and room-to-room acoustics.

“For inner room acoustics, mid-high frequencies reflect harshly off windows while low frequencies pass through rather easily. The more square footage of your space is comprised of windows, the larger the issue of sound isolation becomes and the longer the space’s reverb time will be,” he says. “Reverberation is one of the main concerns in a large space for inner room acoustics as both speech intelligibility and musical clarity suffer with increased reverberation.”

THE BIG AND SMALL OF IT ALL

When controlling noise in a worship space, a large-scale auditorium can use a variety of treatments such as absorbing panels or diffuser traps, while a small space can be helped with less absorption and minimal diffusion.

In an auditorium, Van Wyk recommends acoustically treating the rear wall so that it takes the focus from some building forms (such as fan shape) or just so that sound from the loudspeakers doesn’t bounce back to the platform. For a smaller space, he suggests using

in-ear monitors and electronic drums so that the stage wedge monitors and acoustic drums don’t overwhelm the sound in the space.

Assuming that speech intelligibility and musical clarity are the primary concerns in either situation, the acoustic issues one may face with a large space vs. a small space can change quite a bit.

“One of the fundamental principles in this matter deals with the active frequency range, and the way the size of the corresponding wavelengths compare with the size of the space,” Biccum says. “For example, lower frequencies have longer wavelengths than higher frequencies and may have the inability to fully develop in a small enough space. The result is typically an excessive response in these lower frequencies, which is perceived as ‘boomy’ or ‘muddy’; this is especially problematic in areas of a small room where one surface meets another, such as the corners.”

His approach here would be to implement “bass trapping” such as the company’s M224 Corner Traps or Deep6 Bass trap, in order to give a more controlled response in this frequency range.

“Another common issue with smaller spaces is slap back or flutter



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... acoustics is really the broad category of sound, usually “wanted” sound and its desired characteristics. Meanwhile, noise is unwanted sound, whether getting in or getting out.

echo. This is a phenomenon where sound waves rapidly bounce around the various surfaces due to their relative closeness in proximity to one another,” he says. “To treat this issue, acoustic absorption, acoustic diffusion, or a combination of the two can be implemented.”

WHAT TO FACTOR IN

Van Wyk says the size and scope of the project will dictate what types of issues could become problematic, but other considerations such as musical style should play a role in the design.

He notes: “From an acoustical standpoint, we certainly need to know whether the church is traditional or contemporary in musical styles, or [whether or not] a wide variety of musical styles needs to be accommodated. Musical style will dictate whether the room is designed to be more lively acoustically to enhance organ or orchestral music, or more absorptive for the higher sound levels associated with amplified contemporary music.”

The orientation, size, basic building construction, roof shape, and whether or not there is a balcony also play a significant role in the acoustical design.

“From a noise control standpoint, we start outside of the building

envelope. Is the facility near an airport where planes overhead could be a problem? Or is the facility near a freeway with thousands of cars passing by? If so, we need to know how the exterior walls and roof need to be constructed to block and isolate the intruding noise,” Van Wyk says.

In addition, the placement and type of mechanical units will come into play, especially if they are designed on top of the main worship space.

“We recommend that the mechanical units be in their own room with enough ductwork to isolate the noise levels,” Van Wyk says.

PRODUCT TALK

Products that work well in church environments include acoustical ceiling tiles, damped drywall, fabric wrapped fiberglass panels, acoustical diffusers, musical acoustical shells and towers, and acoustical plaster.

According to Colleran, almost everything involved with acoustics today has gone green, particularly acoustical fabrics, which are made from recycled plastic bottles.

Additionally, some fabric wrapped fiberglass manufacturers are offering a panel that is made from recycled fiberglass, and many of the acoustical ceiling tile manufactur-

ers have recyclable ceiling tiles, as well.

“If the chosen surface materials are hard and rigid, such as brick, marble, tile, etc., the reverb time of a worship [space] will start to increase dramatically compared to a space with typical surface materials like drywall, carpet, drop tile, etc.,” Biccum says. “The chosen surface materials will have a dramatic impact on the inner room acoustics. The more consideration that is put into these materials from the start, the less invasive an acoustic treatment plan may need to be after the completion of a project.”

Keith Loria is a freelance writer focusing on business and design issues, and a regular contributor to Church Designer magazine. When not writing he enjoys spending time with his daughters, Jordan and Cassidy. He can be reached at freelancekeith@gmail.com. 

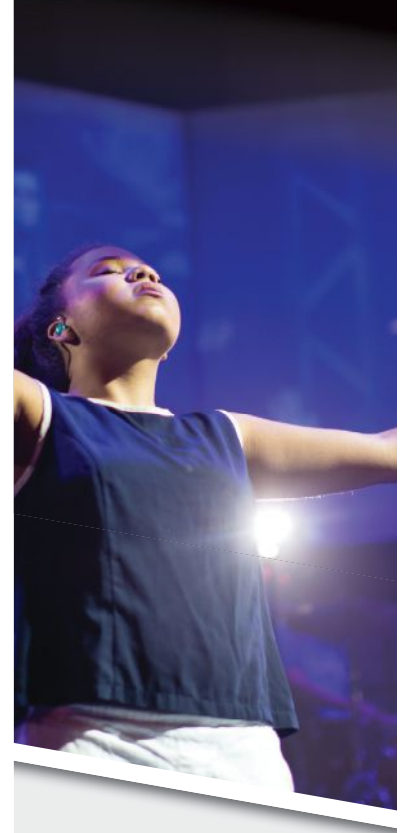
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