Church Acoustics: Past, Present and Future Challenges

BY JIM DEGRANDIS

Some may think that streaming services and megachurch services have different acoustic requirements. This is only partially accurate. If you are delivering a message, the requirements are pretty straight forward – the message needs to be heard and understood clearly and comfortably. How you attain that requirement depends on your environment, and the type of service.

STREAMING THE MESSAGE

Acknowledging the current social situation, it has become necessary to address this problem. Some churches have been streaming their services for years, and while they have worked through many of the technological issues, many are finding new challenges with acoustics.

Some churches continue to stream their services from the same space where they have always worshipped – the main hall. This room may now be mostly empty – if not entirely – and this leads us to one facet of acoustics that is rarely stressed… People absorb sound. If you have a completely empty hall, it is acoustically different than the populated service of the past. If you are streaming from an empty space, you do not need the house speakers – if there are people who want to hear the house speakers, turn them way down. You may need to close dividers, or place additional acoustic material in the space to reduce the energy which

PHOTO: WHEN STREAMING IN AN EMPTY HALL, THERE ARE NO PEOPLE TO ABSORB THE SOUND. ADDING ADDITIONAL ACOUSTIC MATERIAL AND TURNING OFF THE HOUSE SPEAKERS CAN IMPROVE THE SOUND QUALITY.
PHOTO CREDIT: BO VANDALL OF SOUND SOLUTIONS

would normally be absorbed by the attendees. Even if your acoustic treatments were sufficient in the past, it may be a different story in an empty house.

To combat this, other facilities have moved their streaming to smaller offices, or even homes, to broadcast their services. While the future may see more of this, it can introduce a few acoustic challenges. First, the space will likely be a room with hard, flat walls and few soft furnishings. Heavy theater curtains, acoustic panels, carpeting and other absorbers can be used to diminish noticeable sound reflections and flutter. If you're having a 2-way group meeting, your speakers can cause feedback, and every other person with an open mic can be adding to the mix. Virtual conferences in poor acoustic environments will compound the problem, as the poor acoustics of one space can be retransmitted to other spaces, which then add their signature, and so on.

Sound transmission in streaming environments can be problematic as well. If you are streaming from the church hall, this is likely less of an issue - unless your hall is in a multi-tenant structure that has other businesses generating noise. I'm mostly speaking of the streaming from more unorthodox locations like home offices. Homes are historically not broadcast studios by construction and design; however, this is exactly the function we are now performing in these spaces. Sound treatment inside the room is only one part of the issue. Interior doors at home are generally hollow and do not have seals to keep out sound – they are more visual privacy barriers than acoustic barriers. If you can, replace the door with an insulated door, then add weather seals and a door "sweep" across the bottom to block sound leaking around the door. If these options are not possible, you can use barrier material or soundproofing blankets to add a layer of acoustic protection.

The walls and ceiling of a residence are also not made the same as a broadcast studio, and while going into the full construction of a studio is beyond the scope of this article, there are some changes that can be made to improve the performance of these spaces. Adding acoustic barrier material to the walls, which can be hung similar to wallpaper, will help to block sound by increasing the wall's mass. You can then add an acoustical wall carpet over the barrier, to help cut down the reflections and flutter from the walls.

These same solutions improve acoustics for multi-tenant structures as well. They block sound travelling through the walls, both in and out. All facilities can benefit from increasing the sound isolation of the main hall. It helps to overcome external noise, and less sound leaks out – which can sometimes instigate noise complaints from neighbors. If you have a modern worship service with amplified instruments, this is even more crucial. Neighbor noise complaints about contemporary music are increasingly common – and as population centers get more congested, this will undoubtedly escalate in the future.

Neighbor noise complaints about contemporary music are increasingly common – and as population centers get more congested, this will undoubtedly escalate in the future.

Larger facilities have the benefit of space – even having a large parking lot will help to separate the neighbors acoustically by the virtue of the distance between them. This isn't perfect however, as bass frequencies travel farther through obstructions. A bass-heavy service, even in a larger church, can still be audible over great distances. Controlling sound near the source is always the most effective solution. Sound vibrations will travel through a structure, so hanging speakers with isolation hangers and decoupling subwoofers from the structure is a good start.

Louder doesn't mean you can hear it better - it just means it's louder.

Having better acoustics means that your environment is more conducive to listening, understanding, and enjoying what you are hearing. You don't have to make it louder to hear it better… just improve the acoustic environment where the message is being delivered. Historically the answer has been to make it louder – with more speakers, or louder systems. It only needs to be loud enough to hear and understand everything. By controlling the overall volume, you will have less sound leaking out, fewer complaints from neighbors, and less hearing fatigue and damage for those attending the service.

That's right… I said hearing damage. The National Institute for Occupational Safety and Health (NIOSH) recommends less than 15 minutes of exposure to 100dBA sound levels. Many churches use the same PA gear that is used in music venues – which can easily reach 110dBA. This can quickly cause long term hearing damage. Louder doesn't mean clearer – it's just louder. Fix the acoustics of the room and turn the volume down, your ears will thank you, and it will actually sound better. T

Jim DeGrandis *is a Research & Development Engineer at Acoustics First Corporation, member of the Acoustical Society of America (ASA), and works with ASTM International on researching new acoustic testing methods. Jim frequently lectures about acoustic phenomena, simulation, and architectural acoustic design.*