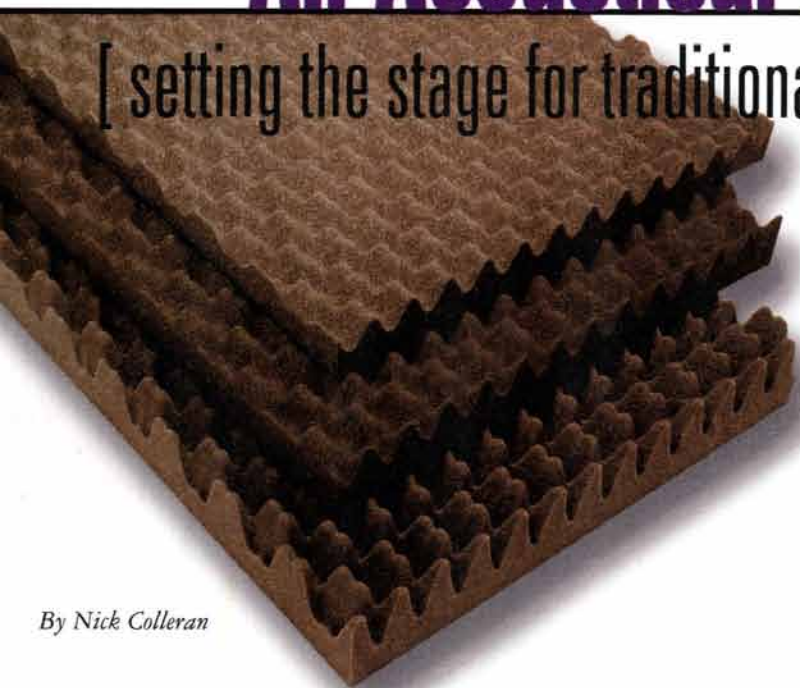


Churches share the same laws of physics with recording studios and concert halls, but must apply them differently.

An Acoustical Balancing Act

[setting the stage for traditional and contemporary services]



By Nick Colleran

Acoustical treatments can prevent unwanted audio reflections from the stage back into the room, which adversely effect the quality of the house mix.

The author was recently privileged to attend a pre-release concert by an established country artist for his new gospel CD. The CD was easily worth more than the \$20 bucks it cost. However, the live performance was infinitely worth more than the ticket price. (It was complimentary.) The record on its own was great but seemed to lack something of the live performance. What was it? Having recorded many gospel records in the studio and in the church, I would say it was two things: the acoustics (something for which the Ryman auditorium is famous) and the audience involvement (joy and appreciative feedback to the performers).

Records strive to have a certain level of perfection and create the illusion of an acoustical environment. They seldom attain the energy from the performers that a live audience evokes. Unfortunately, some churches in their quest to control wayward sound in the sanctuary are moving in the other direction, eliminating the multiple sources of energy from the instruments and their associated amplifiers in favor or control by the sound mixer. Musicians and singers hear the mix "in-ear"

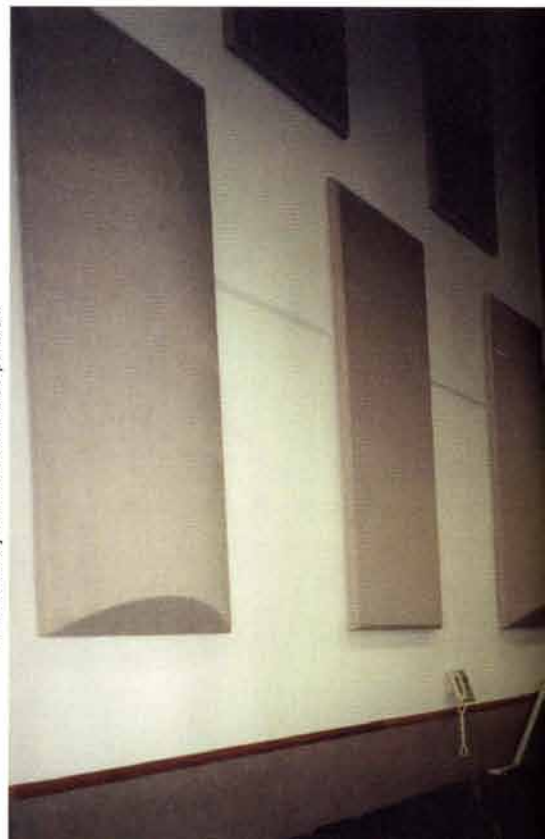


Photo courtesy of Acoustics First Corporation.

and not from the room. The result is a sound that resembles an off-the-shelf record and not a performance that envelops the congregation.

The perceived need for the new techniques come from the performances

having evolved from traditional organ and choir to the full praise band, often made up of musicians who are contemporary performers or who grew up in the 60's and 70's and have brought their big amplifiers and drum kits back to church with

them. A warm (long) reverberation time can, and usually will, enhance the blend of a traditional choir. It will almost always work against the needs of contemporary music. The sound of a soloist with an acoustic guitar may not reach the church back wall. Amplified music will reach the back wall several times as it reflects between front and back walls, overpowering the room and interfering with the performer's ability to hear himself. This usually makes them feel the need to "turn it up".

Acoustical "fixes" can be less costly than electronics, some of which cannot work at all if the physics of the room fight the sound man. Churches that were designed before Edison and Tesla (electricity) can be modified to accommodate traditional, contemporary and mixed services without resorting to techniques that drain the life from the live music. A few examples of these follow:

Sing along

While it is common for the congregation to sing along, and they may often be encouraged to do so, it is not desirable to have the stage sing or hum along with them. In recorded sound's history, flexing wood floors sometimes added a coloration or desirable character to a recording made in a particular sound studio. However, that selling point also became a limiting factor for a different style of music. A flexing stage floor is always a limiting factor to live performances where, unlike a recording studio, the amplified sound system is in the same room during the performance. If a new church is being built, having a solid, poured concrete stage with any voids filled with sand will eliminate trouble at the source. Should

your church have a wooden platform for the band and choir, it will have several problems and, thankfully, some simple but labor intensive fixes.

A bass drum or electric bass amplifier will produce a lot of low-frequency energy which couples through the floor. It will travel up the microphone stands to be re-amplified and into the acoustic piano through its legs to do the same as well as color the piano sound. In addition, some electric instruments have electro-mechanical pick-ups that allow them to act as microphones for this unwanted sound. These problems are overcome with the addition of mass, dampening materials and isolation. The first is accomplished with standard building supplies. The hollow stage should be filled, if not with sand, fiberglass insulation, to fill the drum that is the stage, and by trapping the air. This will make it go "thud" rather than "boing" when excited by the instruments. Mass can be added by layers of sheet rock on the stage under a new platform. Mass-loaded vinyl is often a more easily implemented alternative to sheet rock and requires less space.

To isolate the instruments from the structure requires isolation pads. While treatment of the whole stage may be preferred, it is relatively easy to isolate the major offenders with their own high-mass platforms on vibration pads. These are sand-filled floors made from 2 X 4's and three-quarter inch plywood on commercially made neoprene pads such as those made for isolating machinery and keeping sub-marines quiet. The author once made a drum platform filled with sand resting on nine used truck tires, a truly low-cost

solution. A skirt around the edge and industrial carpet on top will dress it up.

Another source of conflict between traditional vocal music and the contemporary praise band is the wall behind them. A concave front wall may in some way reinforce the choir but it will surely reflect the band's stage monitors and focus the problem somewhere in the church. If this were a Hollywood sound stage, the recommended treatment would be variable acoustics with chain-driven rotating wall panels with three sides of different acoustical characteristics (absorption, reflection, diffusion). Short of doing that, the acoustical characteristics can balance the needs of traditional and contemporary with absorption, diffusion and bass trapping. Absorption with two-inch acoustical wall panels will eliminate the intrusive reflection of the stage monitors. Polycylindrical diffusers will retain some life in the sound returning from the wall, keeping the choir director happy, and at the same time trapping excess bass build-up. (The term bass trap is counter-intuitive. By trapping the bass, the reflections no longer cancel themselves and the player feels less need to keep turning it up.)

Some old and new commercially available problem solvers can reduce and eliminate problems before they enter the acoustic world. In particular, with in-ear monitors there will be no reflections to control. Microphone suspensions such as the rubber donut or "birdcage" cut the path of sound traveling through the stand.

In Conclusion

Church acoustics are unique in their audience participation and the repeating

attendance of that audience in the same acoustical space. They share the same laws of physics with recording studios and concert halls but must apply them differently. What is fixed as one-way in a theater must work in both directions in a church where audience participation is the norm. A church must balance the need for acoustical reinforcement of traditional performance and voice with the need to control the high energy level of the modern praise band in the same space. As soon as sound is released into the air, only acoustics will direct it to its destination. Considering acoustics first will create an environment where the sound system can do its job, adjusting to the different performance styles and the technical proficiency of the individual performers, without fighting the room.

Nick Collieran is a member of the Acoustical Society of America, Past President of the Society of Professional Audio Recording Studios (SPARS), former president of the Virginia Production Services Association, VPSA and is currently active in acoustical design for houses of worship, new acoustical products and performance venues. He is a founding principal of Acoustics First Corporation, a manufacturer and distributor of acoustical materials.



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