SOUND ADVICE

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Acoustical Concerns for Worship Centers

Acoustics or Electroacoustics?

The science of acoustics involves the study of how sound interacts with the physical environment, how humans perceive sound, and what physical factors are needed to provide desirable experiences with sound. The acoustics of a building are involved in complex ways with meeting the functional goals of that building. In many buildings, sound must be played back from recordings, or reinforced to provide adequate audibility. Since this is done through the use of microphones, electronic devices, and speakers, the science of electroacoustics is involved in most new gathering, worship, or meeting places. Not infrequently, a sound problem is mis-diagnosed: either an acoustical problem is thought to be a sound-system problem, or the reverse. A good sound-system consultant can determine where a problem lies.

Acoustics First

In the initial design or renovation of worship centers, acoustics is an important consideration that should not be overlooked. All too often, an architect or design-builder allows the church to disregard his/her recommendation that a competent acoustical consultant be employed early in the design. There are perhaps three reasons that this unfortunate situation occurs. The first is the perception of financial limitations. The cost of acoustical consultation, and of creating or retrofitting a good acoustical design are unknown – and therefore fraught with fear – for many worship-center leaders. The realities are that (1) Most consultants will state either a contract price or a not-to-exceed price for their services without any cost or obligation to the client; (2) one piece of information usually provided in a consultation report is an estimated cost to remediate any problems identified; and (3) surveys reveal that inability to understand speech deters worship attendance, leading to fewer contributors to bear the normal operating expenses; thus, acoustical remediation may well be an investment rather than an expense.

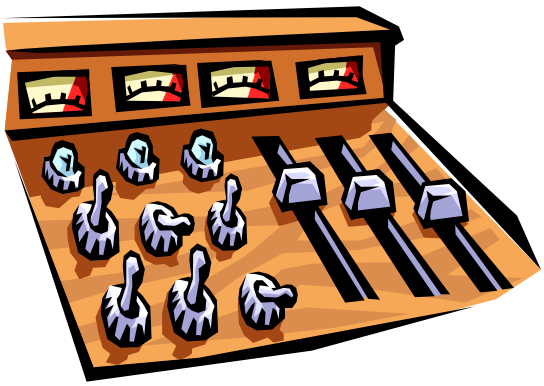
The second reason that acoustical considerations may be given short shrift is the misperception that good acoustics consists of a “dry” room with no reverberation, achieved by putting up a lot of absorptive panels. This misperception leads to objections from musicians and from those involved with visual aesthetics. It also leads to ill-advised attempts at amateur “fixes,” which may create more problems than solutions, and may actually cost more than a professionally-designed solution, especially when the cost of “un-fixing” the amateur “fix” is factored in. This same misperception also leads to the unfortunate practice of waiting until the new or renovated building is complete, then calling in a consultant if necessary at that time. This

approach almost ensures that there will not be enough money to properly address the acoustics, and that any necessary acoustical measures will cost 3-5 times what they would have cost if included in the original plans. The fact is that many solutions to acoustical problems do not involve materials that can be added to a structure after construction, but rather involve proper shaping of the initial design and proper selection of building materials.

The third reason for lack of attention to acoustics at the ideal time in a building or renovation process is a failure to understand the possibilities provided by modern acoustical analysis. For many years, acoustics was considered at best a black art whose results were more the result of luck than science. To the extent that this ever was true, times have certainly changed. Through modern computer modeling, a consultant can examine all the important acoustical parameters involved in good speech intelligibility; enthusiastic hymn singing; good choir and pipe organ projection; distinct, musically balanced contemporary worship music; and appropriate background noise levels in sanctuaries and multipurpose rooms. A CD can then be created that will show how speech or music will sound at any chosen location in the proposed room.

The optimal approach to the acoustical design of any space begins with input from all major stakeholder groups: worship leaders, musicians, choral leaders, congregation members – both normally-hearing and hearing-challenged. The worship style, the range of functions of multipurpose facilities, and the needs of the hearers must all be taken into consideration. Then the consultant can create a plan for analyzing these needs in relation to the other building/renovation goals. Next, the consultant should provide a proposal for the cost of the consulting services. All this should occur at the schematic design stage of the process. Thus one can avoid disasters like the church whose toilets could be heard flushing during the sermon, or the cinema in which the soundtrack played through the excellent sound system was obscured by noise from the adjacent elevator shaft.

Sound Reinforcement



Owners of worship centers have several different ways of acquiring a sound system. Many years ago, the electrical engineer employed by the architect would design the sound system. Fortunately, this scenario rarely occurs today, with sound system design being left to those better qualified to make recommendations in this highly specialized field.

The best choice is often to use a sound-system consultant who works with the acoustical consultant to optimize the sound system design so that the acoustics and the sound system perform symbiotically. A true consultant does not sell or install systems, although (s)he does commission, adjust, troubleshoot, and sometimes repair them. This means that a sound-system consultant is less likely to recommend particular equipment based upon availability and/or profitability rather than suitability for the client's needs. The system is installed by a contractor who bids on the consultant's design.

Another option is to choose a design-build sound company, which utilizes an in-house design team who work with the client to specify the best options. These companies then provide and install the equipment.

Retail music stores often sell sound systems designed for performing groups, and may as a result occasionally install some sound systems. Unfortunately, a music store is less likely to have people with the specialized training and experience needed to provide an optimum system, or to handle the lines of equipment that are designed for quality installations. An oft-repeated scenario explains why organizations often buy three sound systems. The first system was designed/installed by either an electrical engineer and contractor or "Joe, who used to work for the phone company". After some time, better sound with fewer problems is demanded, and a committee is appointed to go to a local music store to buy a replacement system. This new system may be a bit better, but its shortcomings, too, become apparent with time, and finally another committee is appointed who select a consultant or design-build company, carefully check references, and then a system is finally installed that meets the needs of the organization. Certainly this system costs more than the first or the second one, but its cost is far less than the combined cost of all three systems.

An essential component of any new sound system installation is proper training, which should be provided by the consultant, contractor, or design-build company. There should be a clear understanding before any contract is signed as to who will provide the training.

Another essential component is service and repair, both within and after the warranty period. Few consultants are equipped to do more than advise on repair issues, although a few do perform system repairs, especially if the issue is one of the operators' misadjustment of controls.

Many worship centers now regularly use video projection as part of their worship, and this is another area in which there is a great deal of difference between cheap portable equipment and properly-selected equipment designed for permanent installation. The "three video systems story" would parallel the "three sound systems" story, with the first system using too small a screen to be seen by most of the congregation, and a projector of inadequate brightness to produce a high-quality video image, probably having a lens that does not fill the portable screen from a convenient distance. The projector is connected to the computer and/or DVD player by long bulky cables that present tripping hazards. The video may be plagued by poor vertical stability and/or fuzzy bands ("hum bars") that scroll slowly up or down the image. Often, a good sound system consultant or design-build company is also qualified to design a high-quality video system.