A Customer's Last Sound System.

While this article can apply to almost any type of installation, it is based on experience in the school and worship markets.

At Renkus-Heinz, we like to be known as the company that supplies a customer their last speaker system. We say this because odd as it seems many customers are so afraid of spending too much they end up buying their sound system several times before getting the sound system they needed in the first place.

When a church is being designed, often the architect passes the sound system design on to the electrical contractor, a company who can do a fine job installing the power and lighting and who tries to savethe cost of hiring a proper sound system designer. After all, from an electrician's viewpoint, what's so hard about buying a few speakers and wiring them up. Or the architect gives the design job directly to a small sound contractor. You know the one, the new guy who is trying to get established by doing his design work for free. He comes up with a list of the gear he already has or can get a deal on and sends it to the architect as a spec.

When the bids are called, usually the electrician has written the spec so that only he gets the job and the small sound contractor gets the job because his is the low price because he is already trying to unload the gear specified. Sometimes, there is someone even more desperate who proposes a system that is even cheaper and since the architect does not really know sound is generally the one who picks the winner, the lowest cost system is installed.

Almost immediately, these systems are unsatisfactory. Why?
- ? Unintelligibility – The power is too low for the size of the room. And let's not even talk about reverberation.
- ? Uneven volume - Lobes and cancellation effects were not even considered.
- ? Feedback – Poor speaker placement and hot spots in the wrong places
- ? Poor reliability
- ? Just plain unpleasant sound

There are several scenarios for system number two. Often church members volunteer to look into alternatives to make the sound system better without spending a lot of money. After all, in any group of several hundred people, there will be people who have a cousin who works in a music store or who is a roadie with a bar band. So they visit the local music equipment store. After al, the people there are experts. They put together systems for bar bands and those people need good stuff. Right?

This really means the church gets the services of another designer who is unaware of the special needs churches have. A church is a far larger, more reverberant environment than a bar. A church concentrates on the spoken work. Even church music has a far more demanding need for clear vocals than a bar band.

Or the person known by the church member does indeed work for a sound contractor. These are often the small paging system contractor or someone who puts together sound systems for touring rock bands. Or maybe scenario number two involves a church member who is or who has a friend who is a consumer electronics servicer or maybe even has a small sound contracting business. Usually these people are specialized doing background music or maybe service school paging and PA systems. However, just because a person can repair electronics or can install paging systems makes them any more qualified to install a good sound system. It is evenpossible they contact a Renkus-Heinz dealer but the quoted cost for a needs analysis along with doing an EASE analysis of the church puts them off.

So, in this scenario, the designer is selected because they are a member of the congregation or someone a member knows. Not because they have a proven record of being able to out together a good church sound system. System number is purchased but does not really work better than system number one. Then over the years, someone or other gets the idea that all they need is an

equalizer or this or that but these things are just band aids because they have the wrong speakers and they are not aimed properly. Of course, this is after spending twice as much money as the first system cost.

The pastor (and choir) sound more like noise than that God's message and this may even cause attendance to sag. People are always visiting other people and if they hear a church where it sound's great, they may eventually go there. Look at all the really big congregations. They have great sound. The pastor may even eventually visit associates who are having much better luck in attracting and growing their membership. They will experience the crystal clear clean sound that is possible. They may even realize that a great sound system is part of the overall package st

of any proven ability to put together a good church sound system. System number two is purchased and installed, and rarely works any better than the first. But it's now a couple of years later, twice as much money was spent as planned, and attendance is sagging because of the poor sound. The pastor still has poor communication with the congregation, and the praise and worship team sounds more like noise than inspiration.

Desperate measures are called for. If they're lucky, the church comes to the realization at this point that they'd better find someone who really knows what they're doing, a proven expert with a track record. That someone is an acoustic consultant who specializes in sound system design for churches and performance spaces. Someone who understands how loudspeaker systems interact with large rooms, why feedback happens and how to prevent it, how to get good sound and equal loudness to everyone in the congregation and on the platform, how to prevent music from turning to mush, how to prevent hums and buzzes from happening, and all of the myriad other things which can go wrong in a big room. Someone who insists on coming in to meet with the pastor, leaders of the praise and worship and technical teams, study the worship space, and measure its acoustics. Someone who will have to be paid to design the system because they don't work on a commission or markup from the sale of the system.

Why Does All This Have to Be So Complicated?
After all, aren't we talking about nothing more than a simple PA system? Why can't the church just buy a mixer and some loudspeakers at Radio Shack (or a music store) and hang them on the wall? That's what they did in the smaller church they just moved out of, and it worked fine!

There are several major reasons. First, as the size of the worship space gets larger, the demands placed on the sound system grow exponentially. In a small space, the choir and praise band are much less likely to need amplification to carry to the congregation, and there is rarely enough reverberation to make it hard to understand the spoken word. The church I grew up in never had a sound system, and we could hear the preacher just fine! But its seating capacity was only a few hundred.

The larger the space, the more reverberation muddles both the spoken word and the praise band. A related problem are echoes from rear walls, balcony faces, side walls, and ceilings that make things even worse. It takes very skillful sound system design to overcome these problems. It can be done, and done well, but it isn't easy. Sound must be very carefully controlled, focused only on listeners with as little as possible spilling onto walls and ceilings. This takes the right type of loudspeakers in the right place and very carefully aimed. Loudspeakers designed for bar bands or for touring sound are rarely the right choice here.

Second, the place of sound and amplification has become much more central to praise and worship. Music is used to inspire, to lift the spirit, and to bring the unchurched into the fold. Choirs which used to sing with only a piano or organ are now accompanied by a contemporary band. The sound system must be able to make the choir much louder to balance with drums and electronic instruments, and the various musicians must be able to hear each other well to play together. Again, careful control of the sound is key if this is to be accomplished without feedback.

Acoustic design of the worship space is fundamentally important to both of these concerns, and many churches are designed with no competent acoustic advice. Often, there is so much

reverberation in a church that the praise band has turned to mush before the sound system is even turned on. Careful sound system design and enough money CAN provide good speech intelligibility in almost any space. But there is NOTHING that can be done with a sound system to improve the sound of the praise band in a bad acoustic environment beyond overpowering it with carefully focused energy. By this time everything is far too loud for comfort, and often so loud that it both drives people away and causes permanent hearing loss! Certainly not a Christian thing to do to anyone!

The Role of a Consultant
An acoustic consultant is an expert who you hire to design your church's acoustics and your sound system. Some consultants specialize in acoustics, while others specialize in sound system design. Many of the larger firms have people who do both. A consultant needs a good technical education in his field, and a lot of experience designing sound systems for churches and performance spaces. Most have earned degrees in acoustics, physics, or engineering. The sound system consultant needs a solid understanding of both acoustics and electronics, as well as ongoing education to keep up with advances in the field.

The acoustic consultant will help your architect develop the shape and layout of your worship space. He or she will help choose the room finishes for the ceiling walls, floors, to provide the room acoustics which are best for your congregation's style of worship. Which (if any) floors should be carpeted? Should there be pew cushions? Where should the choir be located? The praise band? The organ? The acoustic consultant will also work with the architect to make sure the church is quiet ‹ HVAC systems, elevator motors, door latches, and the like are some of the key concerns.

One of the most important things a good consultant will have to do is help you make hard decisions during both the design and budget process. And they must help you choose between different brands of equipment, and choose the best sound contractor in your area to sell and install your system. Put simply, you need expert, impartial advice. You need to be confident that he or she is technically correct, and is advising you in your best interests, not their own.

Doing It Right The First Time
It really is much better to do it right the first time. And a lot less costly, in the long run, when you realize that most, if not all, of the money spent on the first two systems is wasted! Here are some of the things a good consultant will do when a church (or a new sound system for an existing space) is being designed:

-Send a questionnaire to be filled in by the pastor and by members of the technical and praise and worship teams. This does two things. It helps the consultant understand the congregation's unique needs, and it gets the team leaders thinking about them in a more thoughtful way.

-Once the questionnaires have been returned, meet with the respondents and other key members to work through all the important planning decisions which can affect acoustics and audio.

-If a new system is to be installed in an existing space, make acoustic measurements in the space to be used at the design stage.

-Prepare a written report summarizing all of the decisions reached during the meeting, describing all of the uses which will be made of the worship space and the functions which the sound system should provide, and provides a rough budget for the sound system.

-Work with the architect to get the acoustics right for the intended uses, and to prevent noise from both inside (HVAC systems, motors, transformers, door latches, footsteps in the hall, etc.) and outside the building (highways, airplanes) from intruding into the worship space.

-Work with the electrical engineer for the project to get clean technical power and grounding, so that everyday operation of the system is not troubled by hums and buzzes, and conduit for sound system wiring.

-Work with the mechanical engineer for the project to make sure that HVAC systems are quiet.

-Work with the architect to find good ways to conceal loudspeakers, either by building them into ceilings and walls, or by turning them into architectural elements which don't look like loudspeakers.

-Work with the architect and the congregation on both shaping and layout of the worship space, so that, for example, choirs are in a location where they can be miked without feedback, and so that the relationship between the choir, praise band, organ, and congregation allows the choir to be heard without being overpowered by the praise band or the organ.

-Design a sound system which provides both good intelligibility for the spoken Word and clean dynamic sound for the musical elements of praise and worship, and which is well balanced throughout the congregation.

-Design system elements which provide good sound to those on the platform.

-Review architectural, electrical, and mechanical drawings before they go out to bid to make sure that things worked out at the design stage actually show up satisfactorily on the drawings.

-Help the congregation work through budget issues. Sound systems nearly always cost more than the congregation expects or is prepared to pay. Some parts of the system can usually be deferred and purchased later, but it's usually necessary to dedicate more money to the sound system than was originally planned. These are sometimes hard decisions, and it's important to be working with someone you trust in working through them.

-Document the system thoroughly with drawings, a specification, and a make/model specific equipment list so that it can be competitively purchased from a good local contractor.

-Help you find a good contractor to install the system, and help you either bid or negotiate the purchase with that contractor.

-Coordinate with the contractor during the installation process to make sure things are done right, and work through the conflicts with other building elements which inevitably develop in any major construction project.

-Once the system is installed and tested, come in to work with the sound contractor to tune and balance the system to the worship space, and to verify that the contractor did his work well.

Finding A Good Consultant

How does a church find a good consultant? Strange as it may seem, there are no good lists of consultants qualified to design sound systems for churches. There are professional societies, but they include many who specialize in completely unrelated areas of acoustics.

One way to begin your search might be to ask some of your local sound contractors to point you to the better consultants they've worked with. You'll probably learn two things here. First, if they try to limit you to contact with their sales or "engineering" department, you know you're not dealing with the most ethical contractor in your area. Second, from the better contractors you'll get the names you're looking for. When the same names start showing up on several lists, you know you've got independent consultants.

A second (but generally less productive) way to search is to contact other churches in your area, and within your denomination on a regional or national basis. The problem with this approach is that in most churches, the people who were around during the design process and worked with the consultant have generally moved on to other churches by now, and either don't know who the consultant was or don't know enough about how things went to offer a meaningful opinion. (For

example, if things went badly, is it because the consultant gave bad advice, or because the consultant's advice wasn't followed?)

Finally, interview prospective consultants to find out how they work. Will they do the things outlined in this article? Will you able to make them understand your needs? Will they be willing to help you make hard decisions (like spending more money or changing the room shape), or will they take the path of least resistance and tell you what you want to hear? Are they wedded to only a single approach to things, or are they capable of "thinking outside the box?" Will they slow down to communicate technical concepts to you in plain language, or will all of their explanations fly over your head?