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eGuide to Audio Upgrades: Considerations to Help Churches Get Great Sound

eGUIDE

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Considerations to Help Churches Get Great Sound

The recently opened Casa de Dios is one of Central America's latest architectural wonders. This impressive church is a notable achievement for Pastor Cash Luna and his followers, with years of careful planning and fundraising finally giving them a new home, one that has space for a congregation of over 12,000 in the main hall, as well as satellite youth churches on either side of the main building.

By Ken DeLoria

THE APOSTLE PAUL tells us that faith comes from hearing (Romans 10:17). Modern churches have an ever-growing opportunity to share the message via radio, television and now the Internet. Video and lighting are wonderful additions to a worship service. But don't get distracted, audio is foundational. Just as Paul wrote to his Roman audience, people need to hear and understand the Gospel. And while "digital outreach" is great, the church's primary attention should be focused on communicating effectively with those in attendance on any given week—and that starts with sound.

As we all know, technology changes rapidly; advanced products and practices are emerging almost daily. In preparing for this article, we spoke with a range of integrators and installation contractors to get their thoughts on the effectiveness of various types of equipment, the budgetary constraints they encounter in serving a wide range of churches, and to gain some insight into "best practices" in interfacing with their prospective clients. The results were interesting, especially following a bevy of enticing new product releases at the recent InfoComm show this past June. An ever-present theme—and it should be—is balancing a "wish list" from a "needs list." From these discussions, we offer the following advice:

Be clear about what you believe you truly require to increase production quality or solve reliability issues. Be willing to listen to possible alternatives from a variety of integrators.

First and foremost, start with a solid plan. This is quite different from simply drawing up a list of equipment that you'd like to add or replace. There are many aspects to a modern sound system that need to be "integrated," hence the use of the now popular term "integrator." "Blue sky" discussions with a contractor can be productive, but they can also put stress on your governing board or church elders if the requests for products or services have not been clearly thought-out and integrated into a larger, more cohesive plan. Be clear about what you believe you truly require to increase production quality or solve reliability issues. And then be willing to listen to some possible alternatives from a variety of integrators—some who may be more up-to-date on the latest ways and means to accomplish a specific result.

Conduct needs assessment

As you're identifying what you need, be as specific as possible about what you expect to gain in performance quality, reliability, flexibility, or needed features (such as virtual sound checks, for example) as a result of obtaining the new products and services you are seeking. Vague terms like "better sound" will not do. You will be well ahead of the game if you can identify specific issues that can be written down and submitted to several integrators or contractors, and then see what they come back with in the way of recommendations and prices. You might be surprised at the variety of ways of getting to the goal posts.

The common denominator in the talks we had with contractors and integrators was the importance of starting with a clear and understandable plan designed to achieve

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specific goals. This can make everyone's life easier and help keep costs down. If the integrator needs to write the upgrade plan from notes taken from separate, private meetings with the pastor, elders, and the tech team, it will likely increase the timeframe to get the work accomplished, and potentially result in misunderstood goals.

As you think through the actual improvements you wish to make, imagine them in place. What precisely is needed to keep the ship sailing, in descending order of importance? Are there "must haves" and "wanna haves"? Typically there will be. Once the new equipment is in place, what metrics will you use to judge if the outcome has been successful?

Like any business endeavor, the planning stage is always critical. The upgrade should not be fueled by an emotional desire for a new console or a new line array loudspeaker system, unless there is a solid business purpose behind it. As a tech director, sound engineer or worship leader you are a steward. You represent the church, but remember you will be dealing with business people on the other side of the negotiating table. And while they may (or may not) be Christian-minded and generally good people, they are in business to make money to keep their business going strong and to achieve their own personal goals. Make no mistake, church sound is a business, and a big one. It is important to shop around, but remember that the cheapest option is rarely the best one. Also, don't expect a dealer, contractor or manufacturer to give away their products and services for free.

A church has a larger mission in mind than a business, but still needs to look at capital expenditures. Once installed, will the new system require additional personnel and expertise? For example, will a trained member of the tech team need to be present each and every time the new system is used?

It's also important to make a determination, or at least an educated guess, on the anticipated return on investment (ROI) for adding special holiday productions, community events (graduation ceremonies, etc.) that improved technology can provide. As a business practice, this is usually measured in dollars, but consider including a projection of how new technologies can contribute to attendance growth, or at the very least, help prevent a decline. Measuring the impact of new technologies in terms of souls is something else altogether. Just one significant, moving experience may change a person's life forever. And that is truly our mission. Don't lose sight of it. If bad sound is distracting, or if some in the congregation don't understand what's being said (or sung), the message won't be communicated.

Let's look at some of the challenges that are likely to be present in any significant upgrade, and we'll suggest a few ways to intelligently deal with the common ones.

Start with acoustics

The latest equipment won't solve every problem if the basic acoustical state of the worship facility is inherently poor. But the term poor acoustics is subjective. Many older churches were simply not designed for the higher sound pressure levels and percussive instruments found in contemporary Christian music. Acoustics designed for choir and organ music are generally bad for drums and bass. Also, keep in mind that there is only so much that can be done with EQ and loudspeaker placement. Digital signal processing (DSP) and steerable loudpeakers can do wonders to keep sound off reflective surfaces. But at some point, the raw issue of room reflections may need to be resolved. Acoustical conditions are a complicated matter and cannot be summed up in this short article, but we can provide some pointers.

If the facility is plagued with light flutter echoes, that can oftentimes be dealt with by installing acoustical wall panels that are about three to six inches thick on parallel walls. The panels can be disguised as decorative panels or painted to match any décor.

Longer reverb times, such as those in Southern California's Crystal Cathedral, are not so easy to fix. The amount of acoustic energy that reflects around the room cannot be solved with small wall panels. The solution, in such a rare case, is to minimize the acoustic output from the sound system—avoiding all the flat, glass surfaces—and to train the orators to respect the lengthy reverberant field. "Play the space" is what most musicians learn at an early age. Orators will benefit by learning to change the speed and cadence of delivery. They really have no choice at the Crystal Cathedral, other than to cover the glass panels with large, thick, and ugly absorbent materials.

Most churches, especially those of modest size, have far more options. Absorbers and/or diffusers can be placed in inconspicuous locations, or hung from the ceiling so as not to spoil the architecture.

There are two main elements to acoustics. The first pertains to the sound quality within the space. The second has to do with isolation of the worship space from adjacent rooms (offices, meeting rooms, Sunday school rooms, etc.) or neighboring residents or businesses. These are two separate but related acoustical challenges. Making a space sound good for those in attendance is a skill that takes time and education to develop. Blocking sound from reaching others, also called "transmission loss," is an entirely different matter. It may require additional materials placed on the outer walls, carpets, absorbent "clouds," and/or many other approaches. It will also depend on the proximity of the offended neighbor(s) and the band of frequencies that are bothering them. Usually, it's the low frequencies that carry past the main room, but not always.

The first item of business is to run a full show-level mix through the sound system and then visit the neighbors with a spectrum analyzer to see what's getting through and what is not. The solution may involve improving the HVAC system, double- or triple-glazing the outside windows or keeping

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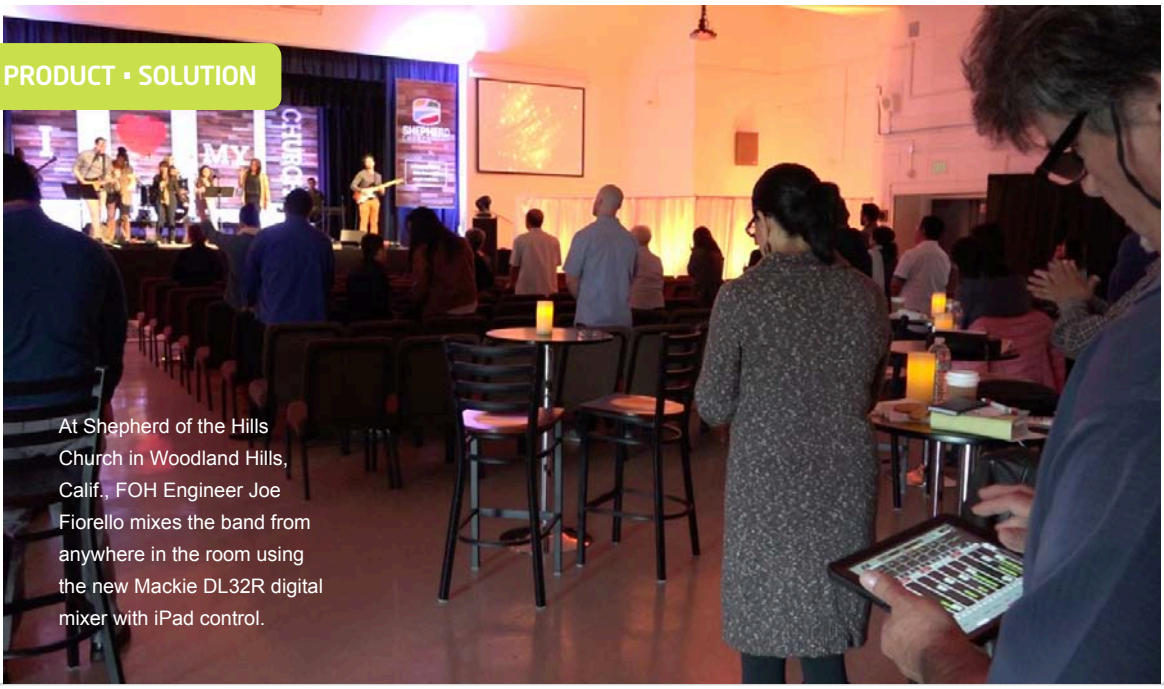

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them closed during a service. Maybe it's not. There are far too many variables to make a checklist, but if you begin the investigation, you'll be able to either (a) solve it quickly, or (b) have a solid report to give to your acoustical consultant who will then spend less time and money on the investigative side of the equation.

Also, believe it or not, your choice of mixing console can play a role in solving both types of acoustical challenges. Stage volume can wreak havoc on an acoustical environment—both inside and outside of the building. Drums and guitar amplifiers are the worst culprits. Floor monitors for vocalists and other musicians can also be problematic for the listening environment. When the stage volume overwhelms the house sound system, the sound engineer has little or no control of the mix. One popular solution is in-ear monitoring systems, where the singer or musician can adjust the sound they are hearing through tiny headphones or ear buds. In many cases guitar amplifiers and floor monitors can be eliminated, thus reducing stage volume and creating a better listening experience for your congregation. Your choice of mixing console could affect the ease with which an in-ear monitor mixing system can be put in place. Certain console manufacturers offer built-in or app-based monitor mixing solutions standard. Other companies offer them as add-ons. Still other monitor mixing systems can be added to virtually any sound system. In short, don't underestimate the need to control stage volumes when addressing your acoustical environment.

Keep an open mind

Loudspeakers and mixing consoles will likely be the subject of the most debate between system designers and church sound engineers. Speaker systems are near and dear to this writer's heart, having been a loudspeaker designer and manufacturer for more than 20 years. So we'll start there. If there's one piece of advice that I can leave you with, tried and true, it's don't cut corners on money, time, or research when selecting the most appropriate loudspeaker system for the task and installing the

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With Iconyx beam steering technology, St. Patrick's church in Owego, N.Y., was able to replace an inefficient, patchwork system of loudspeakers with just a single pair of Iconyx digitally steered arrays. The Iconyx system not only provides better, more uniform coverage, but blends in seamlessly with the room's classic architecture.

> The upgrade should not be fueled by an emotional desire for a new console or a new line array loudspeaker system, **unless there is a solid business purpose behind it.**

speakers in optimal locations. This is not an easy task.

There are, of course, a myriad of options from a host of high quality loudspeaker manufacturers. The range of configurations and dispersion patterns, powered or unpowered—even digitally steerable arrays—are all designed as tools to solve specific design challenges. Therefore, it's best to let the challenges determine the loudspeaker system choices, rather than trying to shoehorn personal preference from a past experience into a system the church is going to have to live with for the next decade or so.

With so many high quality options available, there are very few reasons to make an inappropriate choice. Follow these three steps and your church will be virtually assured of a positive outcome:

1. Hire a qualified AV system designer.
2. Address acoustical issues.
3. Get an on-site loudspeaker demonstration, or do a shoot out of multiple loudspeaker systems in your church auditorium.

Mixing console determinators

On par with loudspeakers, mixing consoles are one of the hottest areas of contention when doing a sound system upgrade. The sound engineer wants a new console.

PRODUCT • SOLUTION

Founder Phil Grimpo's house-of-worship AV firm, Lincoln, Neb.-based Inspirmedia, has significantly expanded its service portfolio since its inception 15 years ago. Inspirmedia has adopted the M-5000 console as its "go to" console for live production, which includes HOW events. The setup includes the Roland M-5000 at FOH, two S-2416 Digital Snake Stage Units for remote I/O and the R-1000 48-Track Recorder/Player for multi-channel recording and playback. Grimpo has big plans for the M-5000: "Corporate events, larger stadium gigs, worship conferences—the M-5000 is going to be a key part of our audio workflow moving forward."

That's his/her tool. She touches it at every worship service and almost becomes one with it—like a guitar or any other musical instrument. But besides a sound engineer's personal preference, other questions need to be answered. The first and most basic is whether to go with a digital or an analog console. To help make that decision, first ask the following questions:

Does your channel configuration change significantly from week to week or even service to service? If so, storing scenes or presets can save time and avoid confusion and frustration. This is one of the most popular benefits offered by digital consoles.

Are virtual sound checks needed? Virtual sound checks are sound checks without the band present. This calls strongly for a digital console, but can be accomplished with analog, and an outboard recorder/player, as well as the appropriate patching gear. If the worship team is moving from one campus location to another on a given Sunday, as some pastors do, a virtual sound check can go a long way towards making things easier.

Will the worship team and the sermon need to be routinely recorded? If the answer is yes, then the choices are to rely on an outboard recorder (never a bad idea if the equipment is specified properly), or to use the console's built-in ability to interface to a digital audio workstation (DAW). Many of the newer digital consoles interface with their own brand of DAW (usually included) or with third-party DAWs that can be purchased for reasonable costs. One example is Apple's Logic Pro X, which is only $200. However, don't forget to factor in the cost of the computer, which will cost much more than the software, unless a suitable machine is handily waiting in the wings to be used.

What are the post-production needs? If they are as simple as editing a few moments out of the service, checking levels and EQ, and then making a CD or streaming, such needs can be met by almost any late model digital console.

Conversely, if a careful and subtle post-production mix needs to be created, say for a special Christmas record release, as an example, then full automation on playback will be a great help to the posting engineer. If the track count is low, say just a couple of guitars and voices, then automation is not vitally important. A good engineer should be able to handle four to eight tracks without too much difficulty. However, if the track count is much higher, and the need for subtlety in the end product is important, then automation may be required.

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A solid backbone is essential to carry signals where they need to go with full digital or analog integrity.

Moving faders on a digital console, especially touch-sensitive ones, can make all the difference between finishing the work in an afternoon or having to re-address it day after day until it's right.

If you don't need virtual sound checks or scene stores and your recording needs are relatively basic, then analog may be the best type of console for your church. Save the money, or invest it in something else. Digital consoles, however, will most likely allow untrained (or lightly trained) volunteers to select from a digital preset and be ready to mix in seconds. But as soon as these volunteers encounter turbulent waters, they may have no idea of what to do next. A digital console has numerous subtleties that are often buried well behind the opening screens. But for more sophisticated technical environments, or those that may become more so in the future, a digital console will almost certainly be the best choice. Digital consoles are getting frighteningly good, at ever dwindling price points.

Infrastructure variables

With the proliferation of IT networks, routing audio to various locations in the church (and

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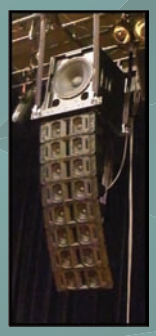

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> ... it's best to let the challenges determine the loudspeaker system choices, rather than trying to shoehorn personal preference from a past experience into a system the church is going to have to live with for the next decade or so.

outside, too) has become much easier and more common. Need a feed to a chapel or overflow room? It may simply require a single Ethernet (Cat 5/6) cable. Want to run audio from the main service to the pastor's office? Chances are that all or part of the infrastructure is already there. A solid backbone is essential to carry signals where they need to go with full digital or analog integrity. Most of the integrators we spoke with say the heavy copper snakes of yesteryear are, largely, no longer spec'd or used in upgrade work. Cat 5 and fiber optics are the cables of choice.

Many modern digital consoles are equipped with their own flavor of digital audio signal transport or network, or they may utilize another standard protocol such as A-Net, Cobranet, Dante, Ethersound, MADI, or others. If you need to interface to the outside world from time to time, such as to a broadcast truck, or if your network includes equipment from a variety of manufacturers, it makes sense to use a well-known protocol. Otherwise, especially in smaller installations, the console's digital audio networking system may be all that you need.

Wireless issues

Lastly, let's look at the rapidly changing wireless domain. Wireless microphones have been a technological mainstay in churches for decades, but the wireless environment

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VQ Series is Tannoy's large-format, high SPL performance audio loudspeaker system designed for any application where precise directional control, outstanding sonic performance, and high SPLs are critical issues. The system uses a patented point-source horn-loaded transducer design. The sound quality, accuracy and control of coverage is second to none, providing definitive and measurable advantages over multiple-horn and co-axial designs.

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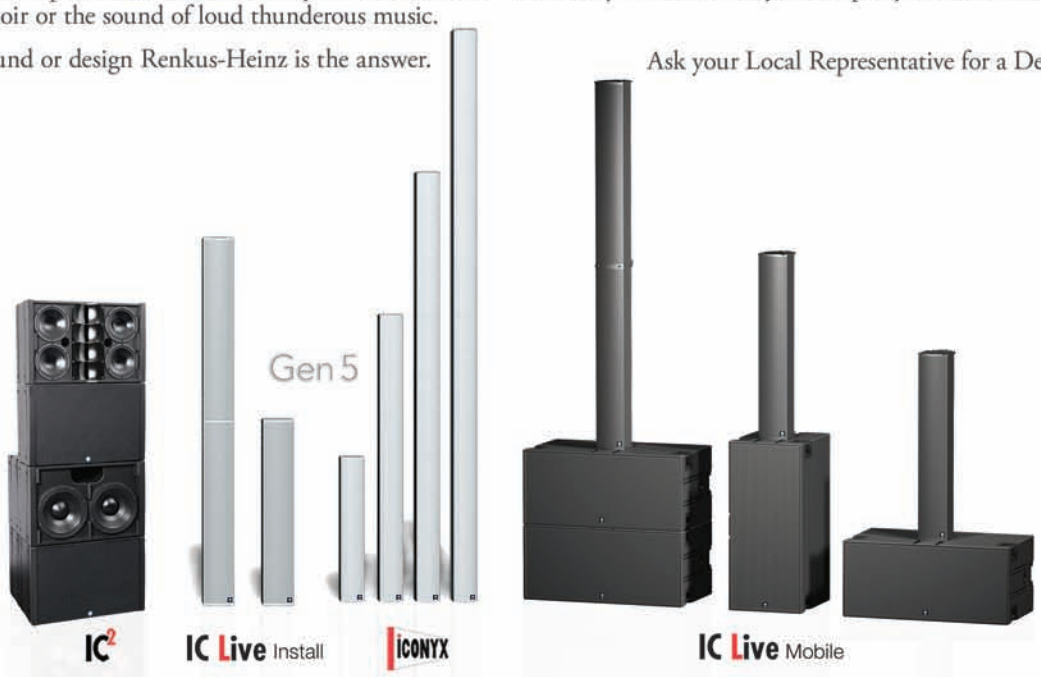

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is evolving and the FCC is clearing certain frequencies to make room for more mainstream applications requiring broadband Internet access. Certain frequencies where wireless microphones once operated are already off limits, with more changes to come. Couple the government's involvement with a proliferation of new wireless "opportunities" for the church (wireless in-ear monitoring systems, wireless mixing consoles, even in-house wireless video transport … etc.) and the need for a professional wireless frequency coordination becomes a necessity—especially in more urban environments.

Conclusion

When your church is navigating its way through an audio system upgrade or adding a new audio system, it's important to ask the right questions—both internally and of your system design and installation professional(s). Define your goals into specific targets. "Better sound" is not specific enough. "More input channels" won't cut it. The more specific your goals, the more well defined the target your design professional is aiming for, and the more likely your new or upgraded audio system will serve you well for many years to come.

Ken DeLoria has 35 years of experience in designing sound systems, loudspeakers, amplifiers, and powered speakers for a broad range of applications that include numerous worship centers. He is the founder and former owner of Apogee Sound Inc. and presently serves as senior technical editor of ***Live Sound Magazine*** and ***Pro Sound Web***.

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