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Core Considerations:

Things to Think About When Choosing Dimming Technology

New Spring Church, Anderson, SC. Photo courtesy of Joel Yates.

By Michael S. Eddy

If you are reading this magazine you already know that there are a lot of ways to enhance your church's activities using technology. Lighting is one of the most visually effective means of transforming a space and helps create focus and emphasis. Over the next few issues, I am going to be taking a detailed look at lighting systems for churches. I am starting with installed dimming systems. In upcoming issues, I will look at controls, lighting networks, lighting fixtures, and all of the components that go into a state-of-the-art lighting system for a church.

Why Use a Dimmer?

To many people, a dimmer is the slider on the wall in their home that brightens or dims the overhead lighting. At its simplest, that's what dimmers do-vary the intensity of a light. I am going to be discussing installed, professional-grade dimming systems as they apply to worship facilities. Many of these dimming systems come from the entertainment technology world where they are used in theatres, theme parks, restaurants, and increasingly today in churches. By varying the lighting levels, you can create different looks and moods for the space. You can set up a "Sunday Service" look; one for "Weddings"; a look for a "Concert," etc. If you use the worship space for performances of the choir or a pageant, you can create the lighting that suits the mood of the pieces. If the service is smaller, you can dim out the sides and back of the nave, so the empty pews are not seen. During a sermon, the lighting can highlight the lectern to give the congregation focus and dim down when you want their focus elsewhere.

Dimming can also lengthen the life of lamps. By trimming a lamp down to 90%, you will lengthen the life of that lamp up to 50% of its rated life. Remember that dimmers are typically used to control incandescent and halogen lamps. If you want to dim fluorescent lamps, you will need a dimming ballast and possibly a fluorescent dimming module specially designed for dimming this lamp type.

What are my Dimmer Options?

When you look at dimming options, you have two main choices in style: centralized dimming, and distributed dimming. Both options have pros and cons depending on your facility. Centralized dimming means that all



your power and your dimmers are placed into a specific location like a mechanical room, and then all the circuits are run from here out to your lighting fixture locations (Figure 1). The dominant centralized dimmer used today is the SCR dimmer which uses a pair of silicon controlled rectifiers (SCRs). SCR dimmers allow the dimmers to be located remote from the controller, which can be located in the rear of the church or in the balcony with a view of the altar. SCR dimmers can be remotely controlled via a control signal, with the industry norm being DMX—a digital multiplex signal that allows dimmers, controllers, and lighting accessories (independent of manufacturer) to work together.

Since the way SCR dimmers cycle power for dimming control does produce noise on the power line when chopping the AC waveform (see Figure 2), a choke is built in to quiet this noise. A choke is a metal core that looks like a donut and wrapped with copper wire. The more copper windings, the quieter the dimmer. This is measured in microsecond rise-time. Normal dimmers are in the 350-500 microsecond rise-time going up to 800-1,200 microseconds for much quieter applications. The trade off is as you go higher in rise-time, more heat is generated and there is some voltage lost. The SCR dimmers installed most often in the church market are in the 350-500 microsecond range.



Figure 1: Centralized dimming places all the dimmers together in a rack system, such as this ETC Sensor dimming rack. Photo courtesy ETC.

The other option is distributed dimming, where the dimmer packages are built into compact units of one to six dimmers and are placed directly in the lighting fixture locations. You run power to various lighting locations and then you can plug in the dimmers so they are now distributed near your lighting fixtures (Figure 3). The most popular distributed dimmers use Insulated Gate Bipolar Transistor (IGBT) dimmers, but some are still SCR-based. IGBT semiconductors effectively replace both the SCR and the choke. IGBT dimmers come in both dimmer bars or boxes and you plug the lights in to them directly at the hanging locations.

Sinewave Dimming is the latest technology in centralized dimmers and it also uses IGBTs. Sinewave offers near silent dimming and the ability to dim almost any load except fluorescents. The downside of sinewave dimming is its high cost, but hopefully as it gains popularity it will become more cost effective.

Weighing the Options

So how do you pick the right option for your church? What are some of the considerations that you need to think about when looking at installing a dimming system in your church? I spoke with consultants, designers, and systems integrators who do a lot of work in church facilities to get their suggestion on things that you should think about when planning for a lighting system.

Everyone agrees that the first question you need to answer is 'how you will be using the space?' Bill Price, director of systems for Barbizon Lighting, believes you must fully answer this question. "Whenever I am going to design a space, it all starts with determining what your needs are, and coming up with the appropriate list for now and in the future. They have to try to answer, 'What do you want to

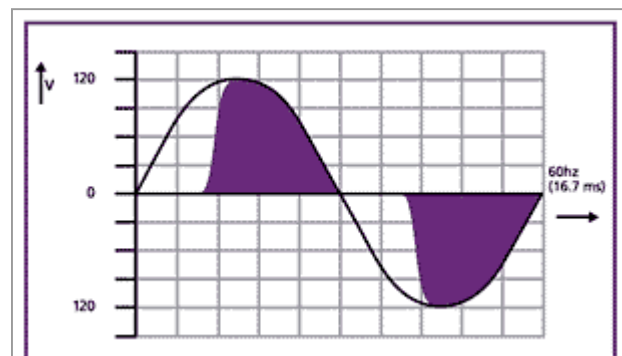


Figure 2: SCR Dimmers achieve dimming by "chopping" off part of the voltage wave form. Graphic courtesy ETC.

do? What are you trying to accomplish? Do you want to broadcast? liturgical drama? Just the Sunday sermon? Each one of those has its own specific demands. If you want to do drama, 'to what extent do you want to do drama? Are you going to do dance? What level of commitment are your productions going to have?' Then sculpting that list back to your core values that translate into the money that gives you where you need to be now and where you want to be eventually. Then all the other pieces fall into place." Bridget Williams, principal and owner of Bridget Williams Lighting Design based in Southern California, adds further considerations to the main question, "Who is going to use the system? You really want to pick a system that has the most comprehensive use for your needs and also the easiest use. How hard is it to use and will it do everything I need?"

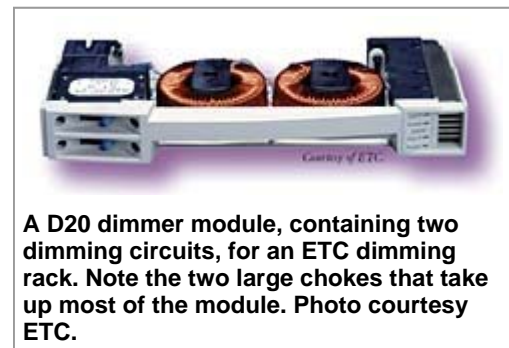
Flexibility is one of the starting points for C. Andrew Dunning, owner of Nashville, Tennessee-based Landru Designs. "How much flexibility do you want? Are they going to be a church that wants to set things up one way and are only concerned about that way? Are they a fellowship that sets it up one way for a few months and then wants to change it around again? That kind of use in terms of flexibility is important to answer."



Figure 3: A Leprecon six-channel stick dimmer is used for distributed dimmer, and would be installed near the lighting fixtures that it would power. Photo courtesy Leprecon.

David Stephens, senior consultant for Acoustic Dimensions talks about the different dimming systems in terms of accessibility. "Distributed systems can be appealing in the right church. Depending on their usage, they may not need to own as much dimming if they can access and move around the distributed dimming. But the fact that you have to move it around is the major consideration. That works best if you have access like a catwalk. If you have to move everything around with a lift, that can have all kinds of other issues. Centralized dimming lets you have one room where you can access all your dimming. When you do a centralized system you have to consider the power, the cooling, and the room. You want to try and minimize your secondary runs—the runs from the dimmers to the circuits; copper is costly. Arguably there is a little less infrastructure cost in a distributed system, but the cost of the dimmer bars is still more expensive than the unit cost of a centralized dimming system. You also have far more control signal cable to distribute in a distributed system than in a centralized system." Dunning agrees that access must be thought through with distributed dimming. "The pro for distributed dimming is that they can be extremely cost effective, but the big con is that if there is a problem with one you have to be able to get to them; sometimes that can be challenging for a quick fix." Paul Wonsek, president of Paul Wonsek Associates, Inc., based in Marietta, Georgia, is a fan of centralized systems. "I have very mixed feelings about distributed dimming. I am one that prefers to have the system all at one location; you always have access."

Planning ahead for problems is also important to Dunning. "The two things that come to mind are dependability and modularity. I am not interested in specifying equipment where the dimmers are not on their own modules (Figure 4). If one goes bad, do I lose 12 circuits at once, or do I only lose one? Also, how quickly can I replace it? These are basic-but big-considerations for the dimmers themselves. In terms of infrastructure for a centralized system, you have to have enough power to run the entire dimmer rack at full, and the air circulation around the rack and your potential air conditioning for the space are really big deals. Often I have seen people put a rack in a space that is too small and the dimmers end up overheating." Dimmers do produce heat, so your dimmer room or mechanical space needs to have the proper amount of cooling to keep the electronics in the dimmers working properly.



A D20 dimmer module, containing two dimming circuits, for an ETC dimming rack. Note the two large chokes that take up most of the module. Photo courtesy ETC.

This space also needs to be kept clean, since rack-based dimmers have fans that pull air across the dimmers and electronics. If the filters get clogged with too much dust, the dimmers may overheat or shutdown to protect themselves.

Wonsek echoes some of these same thoughts on dependability. "Service and dependability are the high points I would worry about. Who is going to be around to service it? If there is an emergency, what sort of support is available? You can't just go by cost; service and dependability will make up for the higher original cost. Electronic equipment can break-anybody's equipment can break-and you need to know that the company has the parts and the knowledge to get you back up and running as quickly as possible. Will the company communicate with you 24 hours a day during a problem? Can the dimmers be fixed? Can someone at the church learn how to reset the breakers, and who will be the service technician when I have a problem?" Williams cautions against cutting budgetary corners that affect dependability. "You can get a cheaper dimming system, but is that system going to be useful to their needs? Ask, 'If something happens to my power, what will happen to my dimming system?' Also, 'If something goes wrong, how do I get it working again as soon as possible?'"

Expandability should be another key consideration. Williams points out, "I like church dimming systems to have the ability to add more to it. Even if they say 'I only want to do this and this,' quite often they will find that they want to do more. You want a system that will grow with the church. I always suggest that you think about the long-term and put the infrastructure in that gives you some place to grow later." Dunning agrees about thinking towards the future. "Planning on room for expansion is a big deal. If you don't think ahead, you have to go back in to pull new power and find more space to expand. It will cost you more in both time and money later."

All agree the best way to understand your options is to investigate what other churches are doing for dimming systems. See them in operation, and ask them about what they like and don't like about the systems. Ask lots of questions of other churches, the manufacturers, the designers and the installers. Dimmers are the core of your lighting system, and have the price tag to prove it. They should last you for years and need to work consistently. The time you spend making an informed choice now will translate into time not spent reinstalling dimmers later.

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