LynTec

Powering Today's Houses of Worship

House of worship audio, video and lighting technology continues to evolve and offer exciting new opportunities to transform their facilities into more captivating spaces.

But in order to fully embrace the market's newest sound and lighting advances, churches have a lot to consider in terms of power distribution and electrical support for LED lighting systems, video walls, projection solutions, sound systems, and much more.

From small devotional spaces to mega churches, houses of worship have been replacing their old-school incandescent fixtures with LED lighting. With advantages such as improved power consumption and life spans of 50,000 to 75,000 hours — far exceeding the life of incandescent lighting — LED fixtures offer churches a solution with considerably lower replacement and maintenance costs when compared to traditional lighting. Furthermore, many churches contain interior architecture elements such as high ceilings or traversing arches, which add complexity and cost to the process of replacing traditional light bulbs.

With LED fixtures, the maintenance cycle for support staff is significantly reduced, resulting in a decrease of service costs. In terms of power consumption, LEDs also bring more luminance per watt, reducing power consumption bills since more of the energy consumed can be converted into light than incandescent fixtures. This can particularly impact HVAC costs by reducing air-conditioning loads. Also, since LED lighting systems are not controlled by central dimming locations, houses of worship can eliminate the need for dedicated dimmer rooms.

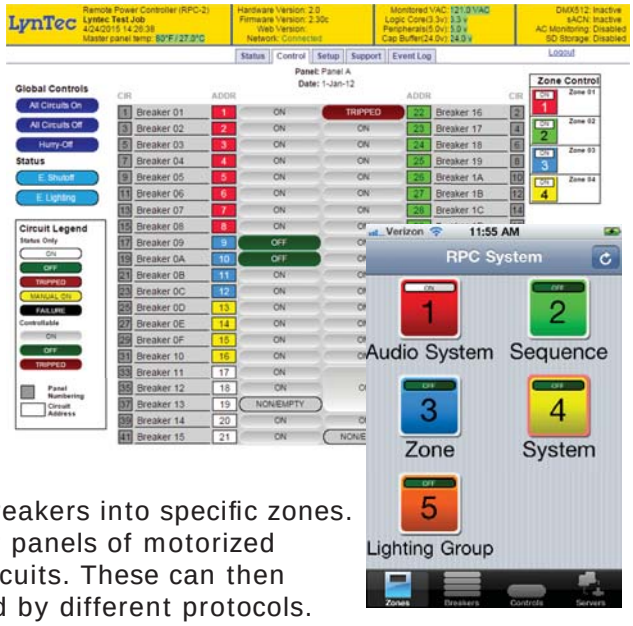
There's only one real catch with LED lighting and other new-generation equipment such as projectors or video walls: in order to maximize their energy efficiency, they must be powered down after each use. Since equipment usage represents a tiny fraction of time in a church's weekly calendar, the ability to deactivate equipment and reduce heat loads is extremely important. Deactivating equipment extends its life and dramatically reduces power consumption for spaces of any size. Also, since the lamp portion of an LED device will often outlast the life of the fixture enclosure, the heat emitted by the LED will dramatically degrade the lamp's life span – even when fading the fixture's brightness strength to black (mistakenly believed to be the same as turning the device off).

When put in standby mode, an LED fixture with built-in dimming, color-changing, or moving capabilities will stay hot to the touch even when the device is not emitting light, since lamp electronics and power supplies remain fully powered. To keep lamps cool, manufacturers have begun designing in fans. However, fans will eventually fail over extended continuous usage, followed by power supplies in as little as 2,000 to 3,000 hours. Ironically, this low lifecycle matches the original duration of traditional incandescent bulbs, thus eliminating any LED efficiencies.

Therefore, the only way to truly realize the promised lifespan of LED lighting is via true on/off control at the source, which completely de-energizes fixtures during standby mode. As a result, large churches — often considered the early adopters of the marketplace — have begun implementing next-generation power management systems that are slowly starting to trickle down to smaller facilities.

Unfortunately for budget-conscious churches, many installers are still turning to outdated technologies for distributing power

in a worship facility. Traditional methods for controlling power loads are based on outlet-type devices, which can be less cost effective when compared to circuit-level control. For instance, in circuits consisting of five outlets, the equal number of devices will need to be purchased and installed in order to turn outlets on and off — incurring greater costs than simply switching off circuit breakers that are already conveniently installed and accessible. The majority of installers are not currently aware that beyond traditional industrial applications, technologies such as motorized circuit breakers can be easily integrated into more “venue-type” applications.



With intelligent advances such as built-in Web servers, users can now control entire installations from any browser-based device, eliminating the need for users or operators to be onsite to verify or turn off equipment. With the ability to interface with multiple protocols, next-generation electrical panel technology can also allow integrators to set up and divide circuit breakers into specific zones. Consequently, a single controller can operate up to four panels of motorized circuit breakers, which translates to as many as 168 circuits. These can then be easily sub-sectioned into distinct zones and operated by different protocols. For instance, both moving and multicolored lights could be controlled with DMX within a church’s sanctuary area while overhead lights could be operated using an energy management platform, TCP/IP, RS-232, or contact closures. This ability to mix and match protocols on a per-zone basis is a great example of the enormous flexibility available to houses of worship.

> “For me, network control or signal point-of-control capabilities are the most exciting features of today’s power distribution technology,” said George Clark, Chief Engineering Officer at Clark. “This allows operators to turn power feeds for lighting or video equipment on or off directly at the circuit level using handheld devices such as smartphones or tablets for remote monitoring and control of all circuits. For instance, a choir director can now ensure that all performance-related equipment has been completely deactivated after a congregation’s weeknight choir practice without having to drive out to the actual facility. Instead, equipment power status can be checked directly from home using an iPhone thanks to power distribution technology that houses built-in Web servers. For small venues that do not employ a third-party control system, this new generation of browser-enabled circuit breaker panels lets installers wire tablets in different areas of the facility, creating an innovative solution for controlling entire zones. The result is an extremely cost-effective option that eliminates the need for budget-sensitive venues to purchase additional costly platform management solutions.”

Within more modest house of worship venues, technology-related budgets tend to be tight. This is a real challenge for smaller congregations that demand the same functionalities as larger-sized churches. These capabilities include moving lights, LEDs for color washing, large projection capabilities, and other popular innovations. However, the only major difference in a small and large installation is their size; in other words, smaller churches can achieve the exact same capabilities as the large churches simply by scaling down project scope and using a smaller number of circuits.

When planning the electrical design for venues of 500 seats or less, installers should first determine voltage needs based on the customer’s preferences for applications and related components that are adequate for the church’s activities. Once this has been established, the next step is to select an adequate power distribution solution for the venue.

Next, a robust technical grounding system should be installed to prevent problems that

could surface later in an installation's life cycle and result in thousands of dollars in rectification costs. Easily installed with today's advanced control panels, integrated gutters can be used to implement isolated grounds directly into panels. This process gives engineers extra room to work and removes the need to wire isolated grounds out to a central location and back to the ground of the facility. Installers also need to consider the dependence of peripheral power requirements, and they need to design in scalability to accommodate future expansion.

Within medium-sized worship spaces that can accommodate services for up to 1,200 congregants, it is vitally important to implement isolated ground panels with K-rated transformers. Should users be unable to invest in motorized breaker panels, basic ground models will still provide the protection required to shield a church's A/V and lighting investments. However, if the budget allows, motorized technology can not only provide remote on/off capabilities but also brownout protection — safeguarding equipment from any voltage anomalies that may travel into facilities. When coupled with battery backups, systems can obtain further protection by utilizing uninterruptible power supplies that provide multiple stages of protection on every connected circuit.

Much like commercial installations, the elaborate A/V and lighting designs of many large houses of worship require a tech support staff of up to 10 people. These teams often consist of lighting, video, and audio specialists who need enormous flexibility to reinvent spaces based on rapidly changing weekly schedules and a variety of events. Since traditional technologies such as multiple dimmers have become extremely expensive to install and operate, large churches are migrating to LED fixtures. Similar to the tour systems used in elaborate theater and musical performances, A/V and lighting installations for churches of all sizes must provide flexibility across entire installations.

"In larger houses of worship, system integration costs tend to be higher and designs more complex," said Clark. "Therefore, flexibility coupled with energy efficiency becomes central to cost-effectiveness and lengthy component life spans — making the ability to monitor currents a very attractive feature for large churches. This usually involves interfacing with large building management systems such as Honeywell where best practices such as Modbus handoffs help streamline monitoring across all levels of a church's systems and installations."

As small, medium, and large houses of worship continue to embrace a new generation of A/V and lighting technology and system capabilities, it's important that they leverage the best practices of circuit control, power distribution, and electrical design in order to create memorable experiences for the congregation, ensuring energy efficiencies and readying A/V and lighting infrastructures for the future. The proliferation of LED walls, multi-projector installations, self-powered speakers, and LED lighting fixtures is creating new power demands and distribution requirements that can become costly and complex to implement if not taken into account during the earliest phases of deployment. By turning to a new generation of electrical panel technologies combined with simple electrical design best practices such as the implementation of isolated grounds and installation of K-rated transformers, houses of worship of any size can protect, monitor, and ready their facilities for the exciting future of A/V and lighting innovation.

To learn more about electrical control options, please visit www.lyntec.com or call 1-800-724-4047