A Hope Church worship service with choir and backup orchestration to accompany singers. Varying lighting coloration illuminates both stage and truss to create a feeling of connection between the audience and those onstage.

The House-of-Worship Systems Makeover

By: Louis M. Brill

Hope Church, in Memphis, goes for a unified systems upgrade

Hope Church, an evangelical Presbyterian congregation, was founded, in 1988, in a living room in Germantown, a suburb of Memphis, Tennessee. Through a combination of persistence and community support, the church expanded over time, eventually outgrowing its existing space. A larger building was acquired, but, according to Hope's creative director, Brian Albrecht, "Although we were seeking a much bigger, more practical, auditorium space, the church was hemmed in by the city's municipal building codes, which resulted in a fan-shaped auditorium with a low ceiling. Despite these obstructions, the auditorium now offers a 5,000-person seating capacity."

When the new auditorium opened in 2007, the church acquired solid, but basic, audio, visual, and lighting systems. "Because the auditorium is so large, video became very important in visually connecting our congregation to weekly sermons and other stage activities," Albrecht says. But as the church settled into its new facility, its systems began to reveal their shortcomings: "Our original audio system was oriented more towards the spoken word; however, during live production, church members found that the music often sounded muddy. Vocal intelligibility also suffered. The lighting proved to be spotty and wasn't theatrically impressive. Finally, the primary IMAG screens, while sufficient for the original install, were located at the back of the stage area, and audience members in the rear of the auditorium had trouble seeing them. All of this led to the decision to improve the AVL systems, beginning in 2015 and completed in 2017.

"Inevitably," Albrecht continues, "the church audio/visual team decided the solution to improving the auditorium's acoustical space would be to install line arrays, to maximize the

All photos: Courtesy of Hope Church

The long arm of Hope Church's video coverage, with a Sony camera on a 16' jib.

audio presence as needed. The auditorium's physical size determined the size and number of line arrays we'd need. The bigger question was: If we did install them in this contained space, what effect would they have on the rest of our audio, video, and lighting systems? We realized that they would interrupt the existing sightlines for the RP IMAG screens. Thus, we knew we'd have to move the screens near the front of the stage, and would need to acquire LED screens as well. We'd also have to move the overhead lighting to match the new LED screen positions. What began as an audio upgrade became a complete revision of the church's audio, video, and lighting setup."

Hope Church collaborated on the project with Diversified, a media integration company, to upgrade the audio and video systems, and with 4Wall Entertainment on the overhead lighting system.

Sound

Diversified, based in Kenilworth, New Jersey, is a full-service systems and media technology integration company, providing consultation, design, implementation, and maintenance of advanced audio-visual systems for corporate, entertainment, retail, and house-of-worship venues. Scott Clark, the company's audio engineer, says, "In the case of Hope Church, we were dealing with a sound system that was previously composed of six clusters of surface planar array technology using ribbon drivers. The result was that every seat in the auditorium had a different sound, and it was hard to tell where the sound was coming from. Furthermore, neither the audio coverage nor the speaker alignment was very good.

"Our beginning fix was to do a system alignment and get the audio better than when we walked in," Clark continues. "But, ultimately, the church wanted a concert-level system. They wanted the speakers to sound like they were close to you, even in such a big room. Our overall plan was to place the sound localization in the seats and nowhere else.

"Given the physical space, I felt that line array speakers would be a good fit," Clark says, "and the auditorium already had a graduated, stadium-style seating arrangement. The rear is 230' away from the stage; its width, from the far corners, edge-to-edge, is at least 330', which is longer than a football field. Not only do line array systems present the feeling that you are closer to the speakers than you

really are, but you end up hanging fewer speaker elements and using less speaker wire, which helps to cut costs.

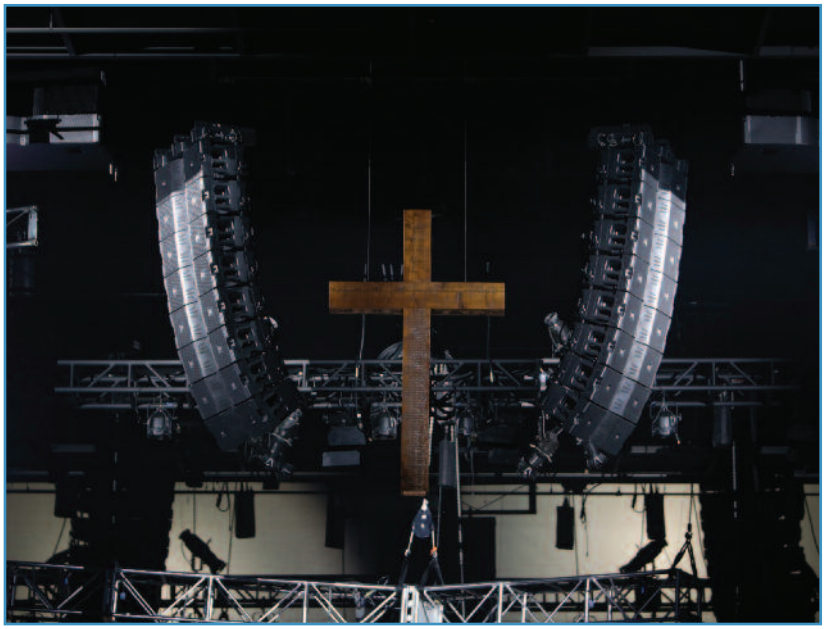
"Hope Church is a contemporary church, and, aside from worship services, they wanted to bring in concerts and performing artists, being one of the larger medium-sized performance venues in the Memphis area," Clark says. "So, bottom line, the church wanted an audio system that could cover the room, get loud, hit hard on the low end, and have a really nice natural sound and tone to fill up that space. They also wanted as much of a stereo experience as possible. That led to my design philosophy, which I call 'continuous stereo.'

"Most multi-speaker stereo systems have groupings of speakers that alternate left and right to fill a room, whether it's a wide seating shape, a fan, or in-the-round. The challenge comes when you are sitting between groups of speakers: You have sound sources on your left and right sides and you create a stereo image. However, if you are seated in front of the speakers, the sound comes from directly in front of you, and you don't really have a stereo image. You have what I call 'collapsed mono.'

"My solution involves working that problem backwards. With continuous stereo, you have no audio coverage directly in front of those seats. You design groups of ceiling-hung speakers, with an intentional gap where they would normally cover the seats sitting in front of them. The gap seating area is covered by other groups of speakers hung in different locations. This essentially creates alternating and overlapping speaker coverage, creating a left and right stereo effect no matter where you sit in the auditorium.

"With all the parameters in place, a few speaker demos were presented to the church, and a review of budget and product pricing, JBL was selected as the complete provider of the new audio system. We chose VTX V20 line array [40 total], a compact, high-output line array element designed to deliver high-fidelity sound reinforcement, configured with a dual-diaphragm, dual-voice-coil compression driver with a frequency response ranging from 80Hz to 20kHz. Its coverage pattern offers a horizontal coverage angle of 105°, and its vertical coverage angle is dependent on the array shape and configuration pattern.

"With the speaker system selected,



The church's cross is flanked by center-stage left-and-right JBL by Harman line array setups.

Video plays multiple roles in church services, including IMAG and communicating the lyrics of hymns.

we set up four line-array speaker groups, all ceiling-hung, directly over the stage. Two line-array groups were hung over stage center, facing away from each other; the other two were placed left and right of the stages' extreme sides, with both sets facing forwards toward the congregation. Another component was JBL S28 subwoofers [12 in total] placed in configuration with the line arrays. Each S28 employs two 2269H 18" transducers featuring JBL's Differential Drive technology, with two voice coils, two neodymium magnets, and extremely high peak-to-peak excursion capabilities. Among its other features, it also functions in a reverse cardioid-arrayable configuration.

"We also used [eight] JBL AC26 speakers, on the edge of the stage, as front fills. Although different rows are covered by the overhead speaker arrays, the front fills give you a sense of the sound coming less from above your head and more toward the front rows. All in all, the audio system is able to easily handle the church's various sonic activities, be it sermons, choir presentations, theatrical performances, and other presentations."

Tyler Cox, the church's director of audio and front-of-house engineer, and Tim Kanter, its monitor engineer, are more than satisfied with the sound system. "A typical Sunday service is very dynamic, audio-wise," says Cox, "ranging from people making announcements to big, full-band moments that might be accompanied by a choir and orchestra. For each of our five weekend services, we're capturing that sound, and it's all a real-time, hands-on audio mix from start to finish. At a larger service, we will have over 80 inputs coming to FOH from the stage, room mics, video production, and local playback. That means 80-plus sources of sound that need to be handled, individually and with care, mixed back together, and reproduced as one cohesive experience.

"Not only are we working with the console and watching the stage activity, we also watch the audience to see how engaged they seem to be. We're

there to mix for the room, and if audience members seem a little disengaged, or whatever we're doing, audio-wise, isn't clicking, we may adjust the mix or the sound levels accordingly. If we see a more responsive audience, we may punch it up a little. As for sound levels, we're typically running between 80dB to the low 90s."

Hope Church has a preferred microphone for every occasion, Cox says: "Our inventory includes [six] DPA D:Fine 4066s, which are head-worn mics for pastors, announcements, and prayer. For singing, we use Shure's wireless UHF-R series with a blend of KSM9 and KSM8 capsules. The guitar is miked with a Shure SM57 and the keyboard is run through a Radial DI box. The drum mics are currently using an AKG D12 VR, and, on the kick outside, an Audix D6. Snares are covered with [two] Shure SM57s on

Truss is illuminated using Mega Lite N-E Color Punches.

Asymmetrical truss patterns help to frame the space above the stage.

top and bottom, the toms with four Sennheiser E904s, and the overhead left with an SE Electronics RN17."

The audio console is located at the auditorium's center in a shared space with the lighting director. The current configuration is composed of a Midas Pro 9 running Waves plug-ins. This is achieved where the audio I/O is managed by the DiGiGrid MGO, which is connected to a Klark Teknik DN9650 (a network bridge) that converts AES 50 signals to MADI and is supported by a Waves SoundgGrid Extreme server. At the end of the hardware configuration is a Mac Mini, which hosts a series of Waves plug-ins, including the R-Series, H-Series, API, SSL, C6, and many others. Although the Mac Mini is hosting all the Wave plug-ins, all its processing power comes from the Waves SoundGrid Extreme and its complementary audio hardware that support the plug-ins. As Cox notes,

"The end goal of this particular audio configuration is to process the stage audio through our suite of Waves plug-ins. The beauty of these plug-ins is that previously they have been predominantly studio-use tools and now can be used in a live performance environment." The backstage monitor position is managed by Kanter, utilizing the Yamaha PM5D, with a DSP5D digital mixing console connected to it, allowing him to have up to 96 inputs with the ability operate up to 24 individual monitor mixes at any given time.

Lighting

4Wall Entertainment's systems and design division provides custom fabrication and project management services for permanent audio, video. and lighting installations of any size. Damon Herbert, one of 4Wall's integrators, says, "In reviewing the Hope Church lighting system, it was obvious that the previous lighting plot was very spotty."

He adds, "They expressed an interest in a 'tour-style' approach, to allow flexibility for future designs. This included exposed and illuminated truss, moving lights, atmospheric haze, and flexible rigging. Essentially, they wanted their lighting to be dynamic and in motion.

"Many of the pre-existing fixtures were incandescent, and it was decided to keep them for budgetary purposes. Using Rosco dichroic filters, we added full CTB to help with camera white levels, bringing all the incandescent lighting to 6,500K. This newly upgraded incandescent inventory includes 142 ETC Source Four units in various models and degree sizes.

"We also added 12 Robe Pointes, four Martin by Harman MAC Viper Profiles, and four Mac Viper AirFX units with Quadray lenses, 22 Mega-Lite N-E Color Punches, 20 Chauvet Professional Rogue R2 Washes, and four Claypaky A.leda K-20 B-EYEs. This became the best of both worlds: upgraded incandescents and moving lights for eye candy. I also recommended a four-point incandescent video wash, with four lights focused at every lighting area, and two crossing front and back lights creating six rows of 10' overlapping lighting areas across the entire stage. This is our lighting wash for video coverage of the stage."

"In a further enhancement," Herbert says, "it was decided to first expand the truss setup as a scenic frame and optimize the video wash, and to mount the effect/moving lights. In total, the church acquired additional Applied Electronics truss sections, including twenty-three 20" box truss, eighteen 20" box truss hinges, twelve 20" box truss, four 12" box truss, and 30 CM ½-ton chain hoists.

"The new truss system covers the entire stage area, some in straight sections and other segments in semi-circles. We thought about curved truss, but that's custom-designed and expensive. Instead, we acquired truss hinges and connected several linear pieces together to get the curved look we needed.

Full AVL configuration is visible in this photo, with line arrays, LED screens, RP screen, and LCD displays.

"We wound up with six unique truss configurations," Herbert says, "all designed to be aesthetically pleasing, with different layers and heights and some units starting high and curving down." Albrecht adds, "One interesting benefit of the system is how it creates a framing effect around the stage, for an intimate feeling of connection between the audience and our stage activity."

Herbert says, "In breaking up the space above the stage, I designed the truss in an asymmetrical pattern and then started distributing lights on them. Having said that, I also gave the lighting some symmetry, despite the truss configuration."

The church's lighting director, Nick Naveiras, says, "For the most part, the conventionals are used for lighting people onstage. The LED moving units are used to create visual atmospheres for the onstage activity. While the Viper Profiles are technically lamp-based fixtures, we consider them to be in the intelligent/effect fixture category, as they are not regularly used to light people."

"One of our main LED workhorse lights is the Rogue R2, which we've deployed through our truss layout,"

Naveiras says. "We use them as a multi-purpose color wash for the stage; as a transition effect, for a colorful glow of backlight for people on stage; or for color chases and motion effects. Another lighting effect is our video camera wash, which comes from our conventional lighting setup. All our conventionals are attached to our ceiling catwalks, as downlighting for the video wash."

Lighting is usually managed alone by Naveiras, with the exceptions of big holiday events, such as Easter and Christmas. He says, "On a typical weekend service, our lighting design process begins about two weeks in advance, when I get a set list and MP3 recordings of the songs. I'll start by designing base lighting looks for the beginning of the service, incorporating some intro lighting for the sermon, and a walk-out for afterwards. For each song, I'll set up a different base look, with a group of lights defining brightness levels, color, and focus presets. All of this is calibrated against the pace of the song, with additional lighting focused on the musicians. All lighting is programmed using [MA Lighting's] dot2 XL-F, and once the lighting setup is locked, all the presets become cues. We also coordinate our lighting to match the video projections on each of our three overhead video screens.

"Rather than hide the trusses, we provided a complete illumination of their frames as they bracket the space above the stage. We've set this up using our Mega Lite N-E Color Punches in the interior of each truss segment to make a glowing look. This allows us to bracket the stage activity with color-illuminated trusses to complement the rest of the stage lighting."

The dot2 XLF was selected as the main lighting console because it was found to be intuitive and easy-to-use. The rest of the control system included two Pathport Connectivity Octo eight-port rackmountable gateways, and a Philips Strand Lighting Vision.net network.

"In our production philosophy, we see ourselves responsible to our congregation and we are very receptive to their feedback," Naveiras says. "For example, they're not into concert lighting effects, like having moving lights passing through the auditorium or moving too fast. All our lighting is either on the stage or the trusses and ceiling. Ultimately, our lighting should be 'invisible,' a part of the church's overall stage experience rather than something that stands by itself."

Video

Diversified video consultant Joe Paryzek says, "The church already had two Christie [Roadster S + 16K] video projectors in place that previously had projected on the Church's two main screens (24' long x 15' tall). With the new lighting system being installed, it was clear that the Christie projectors' brightness levels and visual effectiveness would be significantly reduced. Rather than eliminate them, we choose to stack them on top of each

other, at the back end of the stage, behind a free-hanging rear-projection screen. Double-stacked, with both images overlapping each other, they provide a perfect video backdrop, with supplemental content for the stage."

Two Aeson LED screens (Aeson AL-P 3.91mm, at 18' long by 11' tall) were placed toward the front stage area, flanking the line arrays. Although most of the congregation can see the screens, those seated near the front of house had impaired sightlines. This was corrected with the placement of three Samsung 65" LCD displays installed at the stage front.

Church video director Clay Hutchison says, "Typically, on weekend services, we manage the video coverage with at least seven volunteers, most of them running video cameras. The video camera inventory includes four Sony HDC-1450s, one Panasonic HD570, one 16' Stanton Jimmy Jib Triangle with an attached Sony HDC-1450, and four Marshall Electronics CV502-MB compact cameras, which are stationary remotes installed for location shots we couldn't get any other way.

"Usually, the stage left and stage right LED screens display the main stage activity, while the Christie video projectors present background scenic graphics, which could be anything from screen lyrics, video clips, or backgrounds to accompany corresponding stage activities. In terms of enhancing the look on the screens, we also employ VideoDust (ThunderingJacks.com), which is a special effects graphics package. We like it because of its visual diversity and flexibility, as it provides real-time video effects for IMAG feeds. It's also audio- and light-reactive and is used very carefully, typically as a scenic backdrop for creating interesting musical interludes in keeping the audience continually involved with our on-screen presentations."

The church's video control area has its own backstage location and utilizes a Renewed Vision ProVideoPlayer 2, four Sony RCP-750 camera control units, one Ross Video Synergy 2 camera switcher, a Harris Inscriber, and a Renewed Vision ProPresenter teleprompter.

During the planning of the new systems, church staff debated how much this newly improved media environment would affect the congregation. Albrecht notes, "Sound now envelopes you and creates a more immersive experience. The audience sees much larger and more vibrant images, with improved brightness and higher contrast. Our graphics and live content are much more visually impactful, and we get a lot of compliments from the audience about those features. As for lighting, it's the difference between night and day. Before, we had mostly very conventional fixtures utilized in a functional way. Now we have a full-on theatrical production rig." And amen to that.