Worship**AVL**

RISE AND FALL
Gustav Vasa Kyrka battles high reverberation

SCRIPTING CUES FOR AUDIO, VIDEO AND LIGHTING

CONSISTENCY AT EN-NAEEM MOSQUE

WorshipAVL

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LEADER

It's the dawn of a new year and what better excuse than to make a fresh start? Here at *Worship AVL*, rather than attempt to stick to any half-hearted resolutions (it's too cold outside to exercise and festive food is filling the fridge!) we've taken the theme of new beginnings and ran with it in this issue's KnowHOW section. John Black, Gordon Moore and Ledetta Asfa-Wossen talk us through some of the different methods of scripting a service with lighting, audio and video cues, respectively, on pages 34, 38 and 40. If your house of worship is just starting to embrace new technologies or whether the new year has sparked the desire to switch things up a little, we hope these articles and the tips and tricks within will help you along the way.

While it's always great to plan for the year ahead, it's wise to look back and learn from the past. In this regard, you'll find a fresh set of case studies from houses of worship around the world in the pages that follow.

Speaking of resolutions, ours is to keep bringing you the comprehensive AVL magazine houses of worship need. To help us improve the magazine, as well as online and on social media, please do get in touch and let us know what you think. If you have challenged yourself with a new year's resolution, I wish you the best of luck in sticking to it.

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NEWS

Lighting a landmark

CZECH REPUBLIC: The municipality of Vratislavice nad Nisou, led by Mayor Lukas Pohanka, recently decided to highlight the district's Church of the Holy Trinity, a Baroque church that dates back to 1700 and stands today as a local landmark. ArchLights was approached to propose a lighting design to bring the exterior architecture to life after the sun goes down, resulting in the installation of various Anolis lighting fixtures.

ArchLights' lighting designer Pavel Holzknecht and owner Michal Rehak worked with their team to install Anolis ArcLine Mini Outdoor 18 and ArcLine Mini Outdoor 36 LED luminaires as well as some ArcSource Outdoor 4 MC Pixels. The Anolis brand was recommended by architectural lighting consultant Petr Kolmacka, who helped with the technical specification and final programming during the project. The ArchLights team made the final decision to go with the Anolis solutions due to their compact size, making them visually discrete, and their colour-mixing capabilities. Josef Valchar Jr coordinated the sale on behalf of Anolis CZ, while Radim Zlebek assisted with some of the technical elements of the installation.

With just six weeks between the city council approving the project and switch on, the key challenges to overcome during the installation were ensuring the lighting complemented the church's architecture, designed by Marek Antoine Canevalle more than three centuries ago, and fitting the fixtures to the building unobtrusively while preserving the building's aesthetic and structural integrity.

The ArcLine Mini Outdoor strips were installed directly inside the cavities of the three windows up high on the façade facing the main road. The ArcSource Outdoor 4 MC Pixels, meanwhile, have been mounted onto the façade of the road-facing wall, the annex and the tower using special brackets. They outline the clean architectural lines of the building from the ground to the roof.

A pair of ArcPower DRS (DIN Rail System) units offer power and control for the lighting fixtures. Installed beside a pair of Hager control switchboards inside the church, one can be found in the control room and other in the roof. Both are connected via DMX.

The municipality can select between six pre-programmed colour schemes: cool white, warm white, a combination of both, a Czech scheme with red, white and blue, and two celebratory schemes that use the full colour range. The residents of Vratislavice have reportedly reacted well to the church's new lighting, which has also drawn the eyes of tourists. The mayor and his team are said to be delighted with the results.

'Anolis has a great range of products,' commented ArchLights' owner, Mr Rehak. 'The company also provides fantastic service from consultation right through to technical delivery and after-sales support. With the time pressure we were all under, that was a real benefit.'

www.anolislighting.com
www.archlights.cz

Covering Guru Nanak Jhira Sahib entirely

INDIA: Guru Nanak Jhira Sahib is a shrine to the founder of Sikhism, Guru Nanak. The shrine is located in Bidar, a small town closely associated with Guru Nanak, and was built in 1948 with a gurudwara (Sikh temple) comprising three main halls: the Darbar Sahib, Diwan Hall and Langar Hall. Recent renovation works saw the installation of Audac speakers throughout the gurudwara.

The new audio system needed to deliver consistent, intelligible

coverage throughout the Guru Nanak Jhira Sahib complex.

Sound was to be distributed to the outside areas around the temple, allowing visitors to be involved in prayer celebrations and receive announcements.

Eight Audac HS212TMK2 full-range, 12-inch horn speakers were installed to deliver 360° coverage throughout the gurudwara. Covering the other areas of the site, including the outdoor spaces, are 12 WX802/OW outdoor wall speakers and VEXO8 compact speakers.

www.audac.eu

Lighthouse communications

Jake Dodson (Riedel), Kevin Yap (Lighthouse) and Rajveer Singh (Riedel)

SINGAPORE: Lighthouse Evangelism is one of Singapore's largest houses of worship, comprising two campuses: Lighthouse Woodlands and Lighthouse Tampines. The church has recently adopted Riedel's Artist and Bolero intercom systems and a MediorNet media distribution network for signal distribution and routing across the two sites. These systems replaced a legacy solution that was plagued with issues, including destructive compression and distortion.

'We first approached the Riedel team to understand how their Artist and Bolero intercoms could be useful at our sites,' said Kevin Yap, technical manager at Lighthouse. 'During our discussions, it became apparent that an integrated solution using Riedel's intercom systems – SmartPanels, and MediorNet MicroN and Compact – was going to be the most comprehensive workflow.'

The combination of the wired Artist and wireless Bolero intercom systems provides flexibility to Lighthouse staff. The MediorNet system has simplified audio and video distribution across both worship venues and their classroom areas.

The MediorNet routing system uses fibre to cover several floors at each site. All input and output connection points are user-definable in the MediorNet control software, enabling the identification of each operator.

The technical teams from Lighthouse and Riedel worked together to design a custom solution for each site that can be controlled using a single control system. The same control system manages the Riedel equipment at both sites, meaning the Lighthouse crew can switch between facilities and still know how to configure the systems.

'Lighthouse Evangelism is one of Singapore's best-known houses of worship,' said Rajveer Singh, general manager of Riedel's South East Asia division. 'Our system consulting team worked hand-in-hand with the technical team at Lighthouse to construct a comprehensive and efficient workflow built on our Artist, Bolero and MediorNet families. It is a matter of pride that Lighthouse reposed its faith in Riedel and that our integrated solutions are helping Lighthouse achieve optimal levels of efficiency.'

'MediorNet has given us an amazing amount of flexibility, and our users have had a great experience working with Bolero,' concluded Mr Yap. 'We are thankful for the system consulting and support that Riedel provided and I am pleased to have made the right decision in engaging Riedel.'

www.lighthouse.org.sg
www.riedel.net

St Leonard becomes contemporary

USA: St Leonard Catholic Church in the Wisconsin city of Muskego has recently adopted a contemporary style of worship. Services now include a live band with guitars, drums and a piano, which complement the choir and preaching retained from the former traditional services. To support the addition of contemporary music, the church's outdated sound system, which comprised a single speaker and an analogue mixer with no outboard processing, has been replaced with four TW Audio T20i compact installation loudspeakers, powered by Lab.gruppen D40:4L amplifiers.

The sound system was installed by AV systems integrator, Sven Pro. 'To handle more contemporary services, the church's new system had to provide solid pattern control and clear intelligibility for speech, but also be capable of reinforcing live bands,' explained senior system design engineer, Zachary Lisko. 'It was important that the loudspeakers be unobtrusive so they wouldn't change the overall look of the sanctuary. TW Audio T20i loudspeakers easily met all of these criteria.

'Due to scheduling conflicts, the speakers needed to be available at short notice. Fortunately, TW Audio was able to ship the PA system from Germany to Wisconsin amazingly quickly, enabling us to complete the install within the church's tight timeframe.'

Mr Lisko carefully positioned the T20i cabinets to minimise reflections from the sanctuary's many hard surfaces. As St Leonard has no technical team, the system was pre-programmed with scenes to simplify use for church staff.

'The client needed a system that is very simple to operate and that can be pre-programmed with scenes to allow easy access to the full capabilities of the system,' Mr Lisko confirmed. 'The T20i meets this need with dedicated presets for use with the Lab.gruppen D series amplifiers we installed.'

The Sven Pro team also installed a Behringer X32C digital mixer and a Williams Sound induction loop for hearing assistance.

'St Leonard's new sound system fit their budget. It didn't affect the sanctuary's aesthetics and sounds great in an untreated and reverberant space,' concluded Mr Lisko. 'The parish is very pleased.'

www.stleonards.org
www.svenpro.com
www.twaudio.de

The only 1 you need

ROBE.

Crematorium control over Mount Jerome

IRELAND: A Crestron control system has been installed by McKeon Group at Mount Jerome Cemetery and Crematorium, situated in Harold's Cross on the south side of Dublin. This allows operators in the crematorium to switch between AV sources without delay and manage services across the site's three chapels, as well as to manage heating and control and monitor the lighting.

'A funeral can be a very difficult and sensitive time; therefore, it is essential that the service runs smoothly,' explained Niall Duggan from McKeon Group. 'A technical glitch could easily cause great distress to a funeral congregation, spoiling what is meant to be a respectful and memorable service. The Crestron control solution offers peace of mind that the technology will work. The user-friendly interface means that operators can navigate the system via Crestron TSW 750 touchscreens, avoiding any awkward or insensitive interruptions that could occur.'

The three chapels are known as Victorian, Garden and Angels. Each contains a Crestron Digital Media Presentation System (DMPS) for the delivery of music, video and images. Guests are able to supply visuals from their own devices via the Crestron AirMedia wireless system. The DMPS scaler then automatically resizes the images to fit the screen.

During services, families can either bring their own music or stream from Mount Jerome's song library. A Crestron streaming music player has also been installed in each chapel alongside CD players and USB audio inputs with a Crestron digital signal processor (DSP). The DSP processes, mixes and routes all audio sources, including the microphones and organs. Meanwhile, presets on the Crestron touchscreens facilitate functions such as the fading of music and mixing sources.

The touchscreens are also used to control other aspects of funeral services, primarily through a selection of pre-programmed 'scenes'. Scenes are set to alter the lighting, adjust the HVAC (heating, ventilation and air conditioning) and even open and close the coffin curtain. These preset scenes are designed to ensure the funeral service runs with minimal risk of human error. Different scenes are suited to the various stages of a service.

For very large funerals where the congregation overflows, each chapel has an outdoor speaker, while the site's coffee shop is equipped with a 40-inch touchscreen integrated with Crestron's Digital Graphics Engine 200 to stream the service. Skype video conferencing is also available via the Crestron system, meaning those who cannot attend in person can still witness a funeral or say a few words.

'Families love how easy it is for them to host funerals on Skype and to have a remote family member address the congregation,' said Mount Jerome proprietor, Alan Massey.

The Crestron setup also helps Mount Jerome with energy efficiency as it controls the distribution of recycled waste heat from the cremator to a heat exchanger and then onto air fan heaters and underfloor heating in all three chapels. The recycled heat helps to create a warm and welcoming environment at the crematorium and allows Mount Jerome to meet its green credentials. A Crestron-controlled LED lighting system allows staff to monitor energy use and is preset to automatically switch off the lights when the venue is not in use.

www.crestron.com
www.mckeon.ie
www.mountjerome.ie

Bethel Church goes digital

KOREA: Bethel Church has invested in a Solid State Logic L500 Plus live console for the front of house sound requirements at its sanctuary in Ilsan, along with SSL stageboxes. These were installed by the British manufacturer's South Korean distributor, Hanseo Broadcast & Music Tech.

Services at Bethel Church typically call on 64 input channels of audio. These originate from the drum kit, a bass, a pair of guitars, keyboards, a piano, an orchestra, choir, soloist and pastor. The inputs are distributed from the SSL SuperAnalogue stageboxes through an SSL BL II.D Blacklight II MADI Concentrator to FOH via a redundant optical pair. The

Calvary Chapel integrates AV team

USA: Calvary Chapel Modesto recently relocated its AV control room and in doing so, installed a new Broadcast Pix BPswitch MX production switcher. The Californian church captures live video to deliver image magnification (IMAG) during services for the congregation and coverage for live streaming simultaneously.

The volunteer production team previously worked upstairs in a room with a one-way window that provided a view of the sanctuary. Dave Abbey, media director,

stream feeds simultaneously. BPswitch's PowerAux output provided the functionality needed and the church repurposed its existing Granite control panel. 'It was very important to me that we have the 2 M/E experience without the cost of a 2 M/E switcher,' Mr Abbey commented.

The engineers now work from a booth in the sanctuary. 'In live production, you generally want isolation, but for us that's not necessary,' Mr Abbey explained. 'Now we have all three techs in

explained that the graphics and audio engineers moved downstairs first, followed by the rest of the production team. It was decided to upgrade the existing Broadcast Pix Granite integrated production switcher and other production equipment. Brad C Shields and Associates was responsible for the installation.

The new switcher needed to be able to control the three Sony PTZ cameras installed in the sanctuary, as well as produce the IMAG and

the same room, so communication is better. It's a night and day difference.'

Other control room improvements include a new pair of 27-inch monitors, a new Soundcraft digital audio mixer and a Dante digital audio network. Calvary Chapel also added a touchscreen monitor for using the Broadcast Pix Commander user interface to switch between feeds for IMAG.

www.broadcastpix.com

L500 Plus console has an additional touchscreen connected, as well as the SSL Solsa online/offline control application for use on a PC.

The SSL L500 Plus serves as a digital replacement to an old analogue console. 'We looked at a lot of consoles from all the main manufacturers,' said Tae Young Kwon, chief engineer at Bethel Church. 'Our criteria included reliability, scalability, intuitiveness, price and service. It was a difficult process but, in the end, the deciding factor was sound quality. We chose the L500.'

Remote control was another consideration. 'It's a big church, but we operate with only a few staff,' Mr Kwon added. 'Except for Sunday worship, we often work shifts alone, which was very difficult with the analogue console – continuously moving from stage to FOH to check the monitors. Now we can easily adjust the monitor balance on stage with TaCo – SSL's remote tablet application.'

www.han-seo.co.kr
www.solidstatelogic.com

Christian Faith Center leapfrogs HD

USA: With its programmes broadcast on national television, the Washington-based Christian Faith Center was overdue an upgrade of its standard definition video production equipment. Rather than simply move to an HD setup, the church leadership team chose to invest in 4K/UHD-capable equipment to avoid another future overhaul.

The decision to upgrade the equipment was made following requests from TBN (Trinity Broadcasting Network) and the Hillsong Channel, which both broadcast Pastor Casey Treat's show *Successful Living with Casey Treat*, for the programme to be produced in HD to match the quality of their other content. Chad Rose, president of systems integrator Rose Media, was called in to oversee the transition, which included the deployment of four

Blackmagic Design Ursa broadcast cameras. Two are equipped with Fujinon XA55x9.5BESM zooms, while the other pair are fitted with XA20x8.5BERM zooms.

'The church was very interested in the Blackmagic camera because of its price point,' said Mr Rose. 'Churches are beginning to see cameras as a four- to six-year investment. They put more of their money into long-term investments like lenses.'

Rose Media also installed Blackmagic switchers and multiviewers, a Renewed Vision graphics system and new furniture in the church's new control room.

'They went from a much older SD system and, without any training or rehearsal, they were running the new cameras and lenses,' Mr Rose confirmed. 'It was truly a seamless transition. While the goal was HD, the

entire system is now 4K-compatible. From the switcher to the cameras and lenses, to the multiviewers, everything is 4K. They just turn it on in the switcher and they've moved from SD to 4K in one fell swoop.'

The cameras are positioned over 30m away from the stage. This meant that the lenses needed to be capable of covering the distance. 'Matching the 4K image sensor of the Ursa camera with the Fujinon lenses is just a great combination,' Mr Rose claimed. 'The film-type sensor of the Ursa combines with great lenses like these that can maintain focus throughout the zoom range and handle any lighting situation.'

www.blackmagicdesign.com
www.christianfaith.us
www.fujifilmusa.com
www.rosemedia.tv

Compact speakers complement growth at GBI Aruna

Big Knob Audio's Pongky Prasetyo, GBI Aruna's Marshall Pins and Stevannus Yordan, and Big Knob's Timo Wibianto

INDONESIA: GBI Aruna was added to the Gereja Bethel Indonesia portfolio of churches when it was constructed in 2007. The congregation has consistently grown in the proceeding 11 years and, to ensure that the up to 1,600 worshippers who fill the sanctuary can all hear clearly and enjoy the church's music ministry, the pastoral team recently decided to upgrade the sound system, opting for Adamson IS-Series speakers acquired from the manufacturer's Indonesian distributor, Big Knob Audio.

The church had invited the representatives from three loudspeaker manufacturers to

demonstrate their systems in the main sanctuary. Following a comparison, the IS-Series system comprising IS7 2-way loudspeakers and IS118 and E218 subwoofers demonstrated by Big Knob Audio was chosen.

'There were three criteria that needed to be met: light weight, even coverage and, of course, a high degree of musicality,' explained Stevannus Yordan, head of the music ministry at GBI Aruna. 'The IS-Series met them all and sounds very luxurious. It reinforces the worship environment like never before.'

The setup installed is formed of eight IS7 cabinets per side, flown

with a single IS118 subwoofer at the top of each array. Four ground-stacked E218 subwoofers line the front of the stage for additional low-end reinforcement, while a further pair of IS7s are deployed at the lip of the stage as front-fills.

'The Adamson IS7 is so lightweight and compact, it's amazing to experience such powerful sound coming from the system,' said Marshall Pins, GBI Aruna's senior sound engineer. 'Not only that, it provides very consistent tonality from front to back. We worked with Big Knob on the design using Adamson's Blueprint AV software,

which was very helpful in fine-tuning the system to achieve even coverage throughout the seating area. It is such a joy to mix on this system.'

'The IS-Series is purpose-built for install applications like this, offering a remarkably easy installation process, incredible sound and a sleek, unobtrusive package that keeps the congregation's focus on the words or music being shared,' noted Timo Wibianto, senior partner at Big Knob Audio.

www.adamsonsystems.com
www.bigknob.net

Treating Säter Church

SWEDEN: When Säter Church was originally built in 1637, and even when it was reconstructed between 1778 and 1779, there was no need to consider the acoustic challenges presented by loudspeaker systems. Until recently, an audio system that had been installed for several years failed to deliver even coverage and clear, intelligible sound. Therefore, the church management enlisted the help of Robert Nilsson of systems integrator DAT AB, who provided a solution in the form of Renkus-Heinz Varia Series modular point source line arrays and SA Series modular power amplifiers.

'The church had a reverb time of around 5s, bad reflections and bad sound for the choir, even without a PA,' reflected Mr Nilsson. 'The only thing that sounded fine was the organ.

'We could not use acoustic treatment, place loudspeakers in new positions, install conduit or bring in new furniture for the mixing desk. And the budget was tight.'

The DAT AB team produced an EASE model of the church to design a suitable solution. 'We quickly discovered that the Renkus-Heinz Varia system was the best system for our customer,' Mr Nilsson recalled. 'We made several [EASE] Focus calculations so we could see that even coverage and smooth response could be obtained within reasonable limits. The customer was excited that we could deliver this coverage using their existing loudspeaker placement.'

Consulting with Renkus-Heinz on the project, DAT AB installed a Dante-networked system, enabling the SA Series amplifier modules to drive a trio of Varia VAX101-7 and a pair of VAX101-22 cabinets. 'With only three pieces of 16mm pipe through the roof, we could use all safety wire, with Cat-6 cabling for the Dante network, Rhaon system control and 230V power,' noted Mr Nilsson. 'We installed a Dante-enabled Soundcraft Impact mixing desk and, thanks to our skilled employee, Björn Dahlström, we were able to reuse the old sound system furniture for the new mixer.'

Following installation, a little fine-tuning was in order to fully solve the acoustic challenges inside the sanctuary. 'During tuning and commissioning, using AFMG EASERA and SysTune audio measurement and analysis software, we finally got to the point where we could identify the frequencies of the reflections,' Mr Nilsson concluded. 'The system is smooth to work with and allows for custom presets, so we could test and tune it to respond as needed, depending on the activity of the church.'

www.dat.se
www.renkus-heinz.com

Mixing as is IGodsWill

Taechan Moon with the dLive S7000

KOREA: IGodsWill Church has purchased an Allen & Heath dLive digital mixing system and an ME personal monitoring system. Both were supplied by Sama Sound and are used for the Seoul-based church's trio of Sunday services and weekly 'festival' events.

With no permanent home, IGodsWill is a mobile church that uses a local high-school auditorium for its three Sunday services. The first service features classical music performances, while the second serves up 1980s' pop and the third delivers heavier rock. With an eclectic mix of music genres, the church required a versatile sound solution, yet something that was still easy to set up and use for its team of volunteers.

The dLive system comprises an S7000 surface at FOH with a DX32 expander and Dante card, while a DM48 MixRack is mounted on stage. 'dLive's user interface and strip layouts are very intuitive,' commented Taechan Moon, sound engineer at IGodsWill Church. 'Even if you aren't a professional engineer, the time it takes to learn the basics is short compared to other digital consoles.'

During rehearsals, the church's pair of monitor engineers use iPads running the dLive MixPad app and interact with performers during the sound check to adjust monitor mixes there and then. A PC loaded with the dLive Director software is connected to the DM48, offering complete control over the mix from the stage.

An ME-U hub is also connected to dLive. This distributes audio to six ME-1 personal mixers used by the performers in the God's Will Praise worship band.

'dLive is a very stable system in terms of sound and its connection between the MixRack, S7000 surface and Dante network,' added Mr Moon. 'It allows you to easily create your own unique mix, taking advantage of the wide range of customisation and processing applications.'

www.allen-heath.com
www.igodswill.org
www.samasound.co.kr
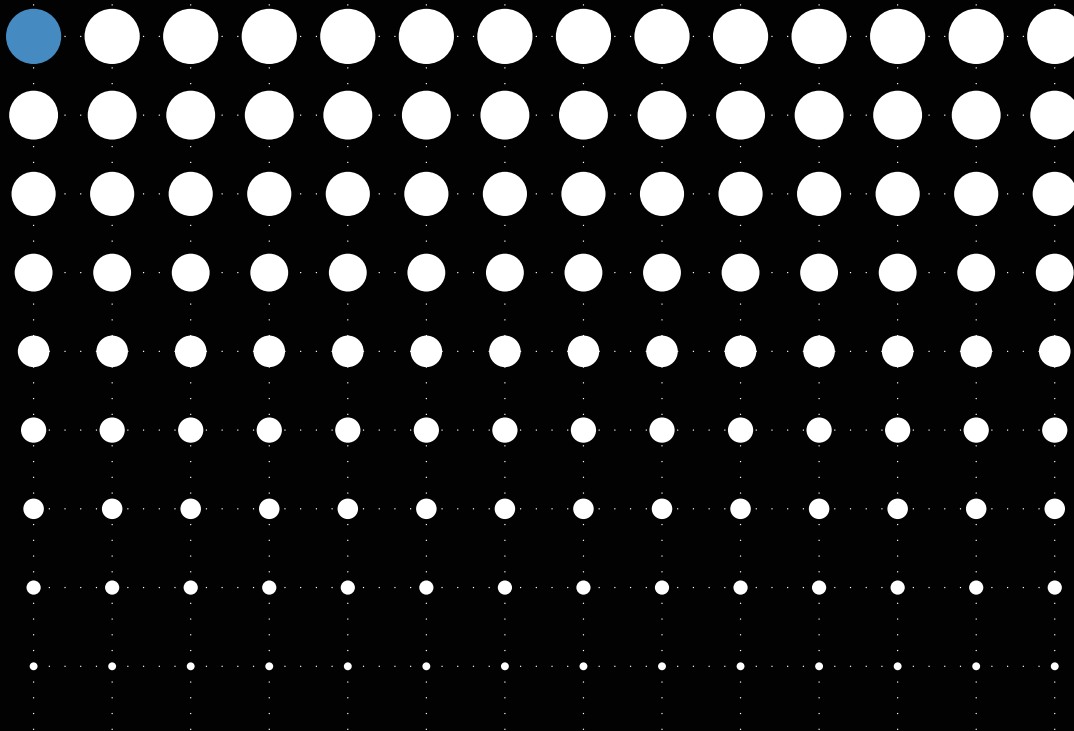
DaVinci attends Summer Camp

USA: Student Life runs interdenominational camps across America. For 2018, Nashville-based Elite Multimedia Productions served as the lighting, video and audio vendor, providing an Elation Professional touring lighting rig comprising Artiste DaVinci LED moving head luminaires.

Five teams travel the US to set up and manage each camp. 'We take care of all of the details, including programming and worship, so that the student pastor can focus on ministry,' explained Jake Brantley, director of production for Student Life Camp. 'Our technicians are generally 20–22 years old and still in school. We take young guys and girls with little experience and hand them a full-size rig to tour around the country with. Our lighting designs are simple enough for a beginner to walk in and successfully run a service, but complete enough to keep the more experienced entertained.'

Artiste DaVinci LED mover was an integral part of the 2018 Student Life rig. 'We chose the DaVinci to function as an LED replacement for 700W discharge lamp fixtures,' said Jason Jenkins of Elite Multimedia. 'It has the same, if not better, output and similar feature sets as the 700W discharge fixtures, only with better optics, smoother colour mixing and drastically reduced power consumption.'

Mr Brantley worked with Chris Kulow on the lighting design for the 2018 Student Life Camps. Artiste DaVinci fixtures were used as the main profile fixture – four were positioned on an overhead truss and four were on the ground. Elation Platinum Seven LED moving heads were also used for front wash and Elation Rayzor 360Z beam/wash LED moving heads provided effects.

www.elationlighting.com
www.elitemultimedia.com
www.studentlife.com

Catharinakerk glows

NETHERLANDS: A total of 12 Christie D20WU-HS projectors were recently used for a video mapping project on the face of the 19th-century Catharinakerk neo-gothic Roman Catholic church located in the centre of Eindhoven as part of the GLOW Eindhoven international light art festival. The projectors were provided by Sahara Benelux.

The video mapping piece, *Confluence* by Ocubo, was inspired by the confluence of rivers and streams in Holland. Virtual dancers and geometric shapes guided viewers through the film.

www.christiedigital.com

Image courtesy of Bart van Overbeeke

Word of Life delivered by local reinforcement

USA: The Word of Life Christian Center in Darrow, Louisiana turned to a neighbouring manufacturer for its new sound system. Located 20 miles north of the church is the Baton Rouge headquarters of PreSonus, which made the selection of new audio equipment much easier to make with such local support.

Pastor Leroy Thompson led the church's sound reinforcement upgrade, which included WorxAudio and ULT series loudspeakers, a

Amos Singleton
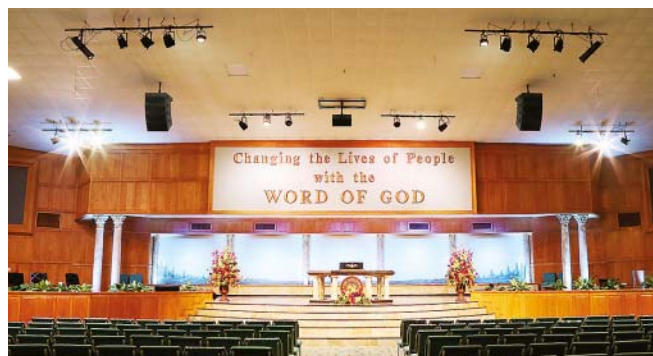
StudioLive Series III digital console, EarMix 16M AVB networked monitor mixers and a SW5E 5-port AVB switch among other PreSonus equipment. The sale was managed by Guitar Center Professional and the installation was carried out by I Am Music.

'Prior to the new system, the space used a collection of outdated point source loudspeakers that were both underpowered and failed to provide consistent coverage throughout,' said Jason Lindgren, account manager at Guitar Center Professional. 'Because of this, church management was adamant about the ability of the new system to provide even coverage, along with a high level of speech intelligibility and solid music reproduction characteristics. This is what ultimately led to the deployment of the PreSonus equipment.

The I Am Music team, led by president Amos Singleton, flew eight WorxAudio XL1i-P line arrays split between left and right clusters. A WorxAudio X1M provides

centre-fill, while two WorxAudio V5 compact enclosures to the far left and right serve as side-fills. Low-frequency support is delivered by a pair of WorxAudio TL218SS super subs. On the stage, PreSonus ULT10 2-way point source cabinets are used as monitors.

'The big issue here was with the layout of the sanctuary, which made even coverage and speech intelligibility a huge challenge,' recalled Mr Singleton. 'The WorxAudio loudspeakers have an extremely wide 160° horizontal dispersion pattern that made it far easier to provide consistent coverage throughout the space.'

The end-to-end PreSonus setup has achieved the church's desired results. 'They are totally happy with the installation and everything related to the PreSonus gear they purchased,' Mr Singleton confirmed.

www.amossingleton.com
my.eiwm.org/wolcc
www.guitarcenter.com/GC-Pro
www.presonus.com

Flexible sound for Sarangsaem Church

KOREA: Sarangsaem Church recently enlisted the services of AV systems integrator Kinoton Korea to install new sound systems inside its Great Chapel, meeting rooms and classroom spaces. The church incorporates elements of local culture into its services and the site also plays host to a wide variety of events. Therefore, Kinoton Korea sought a solution that would offer the flexibility to cater to events and services of contrasting styles in the Great Chapel, and opted for JBL VRX932LAP line array speakers and VRX918SP subwoofers.

The VRX932LAP was chosen for its constant curvature waveguide and array coherence that make it suited for medium-sized venues without long-throw distances, such as the Great Chapel. JBL PRX812W powered speakers were also installed in the Great Chapel. These serve as stage monitors and can be deployed as a portable sound system when required.

'We wanted to make sure our Great Chapel could be used for a variety of events by our members and the local community,' confirmed GyeongHwan Park, representative minister of the Sarangsaem Church. 'To achieve this, we required robust loudspeaker solutions to support a range of activities and functions, including weddings, holiday celebrations and art therapy sessions for underprivileged children. The JBL systems installed by Kinoton are perfectly suited to serve our needs as a church and as a special events space.'

Meanwhile, Kinoton Korea equipped the classrooms and meeting rooms with JBL Control 25AV, AC26 and AC28 loudspeakers.
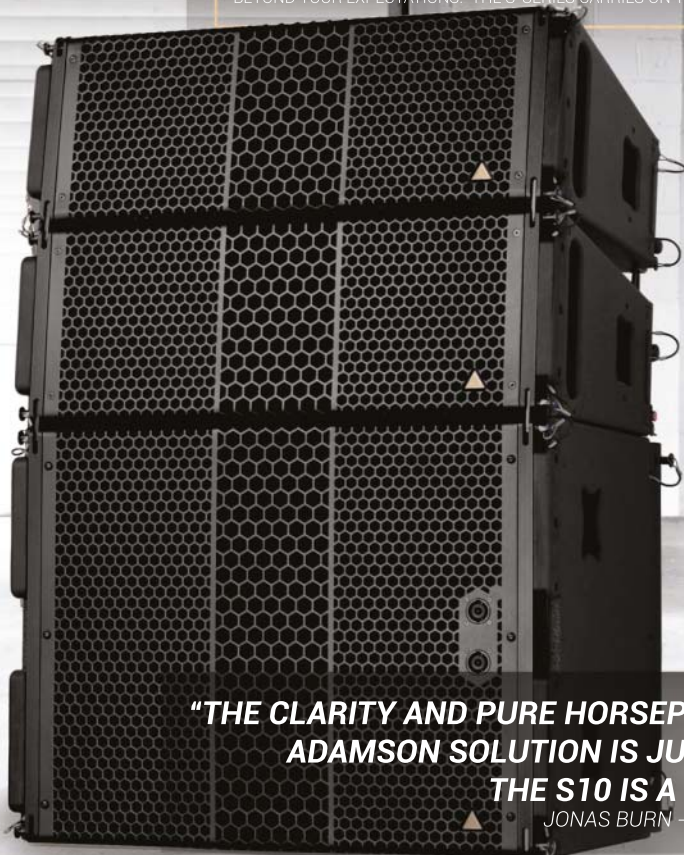
www.harman.com
www.kinoton.co.kr

Decibells adds Thump to CSI Sawday Church

INDIA: The CSI Sawday Church in Kadalur has added Mackie Thump15A powered loudspeakers and a ProFX16v2 mixer to its sanctuary in order to support its dynamic services. The systems were supplied by Mackie's Indian distributor, Sonotone, and installed by Decibells Acoustics.

'CSI Sawday Church was in the process of a complete overhaul and was seeking an efficient and comprehensive audio package that would deliver top-quality reinforcement for speech and music during their regular services,' explained Mr Joy from Decibells Acoustics. 'We opted to go for the Mackie Thump15A powered loudspeakers as we have deployed them across many other churches in the area. As for the Mackie ProFX16v2, the compact mixing console not only offers clean sound and unmatched power but also brilliant stability.'

www.decibells.in
www.mackie.com
www.sonotone.in

Audio above all at Christ Fellowship

USA: Christ Fellowship Church has L-Acoustics sound systems installed within the majority of its eight South East Florida sanctuaries. While systems integrator Mankin Media recently equipped the church's new Port St Lucie campus with another system from the French loudspeaker manufacturer, a different approach was taken with the system design.

An L-Acoustics K2 system was specified before any other part of the building design process, which then influenced the layout of the sanctuary.

'The ability for Soundvision to interface into that process makes it much faster to marry loudspeaker coverage to architectural details as they are developed and adjusted, as well as being critical to ensuring there are no surprises when it comes to coordination with theatrical lighting and very large LED video canvases,' said Tim Corder, senior solutions advisor at Mankin.

The system installed comprises 20 K2 and four Arcs II arrays with 10 K1-SB and four KS28 subs. Designing the room with the audio

'Anyone who designs and installs audio systems for enclosed spaces knows that there are always going to be acoustic challenges that go along with the room; it's just the nature of live audio,' explained Christ Fellowship's audio director, Danny Dagher. 'Mankin helped us turn the typical house of worship audio installation on its head. Where we would normally be moving PA elements around to make up for pre-existing acoustical issues within the room, in this case, we were able to make revisions to the seating layout and even wall placement during the building design phase so that the room would best support the PA.'

L-Acoustics' Soundvision 3D acoustic modelling software was used by the church, the construction crew and Mankin engineers during the design phase.

system in mind resulted in the need for fewer fill speakers, as only one X15, two X12 and seven X8 enclosures were needed for complete coverage throughout the 1,900-seat space. The entire system is powered by 13 LA12X and a pair of LA4X amplified controllers.

'This was our first project with Mankin Media and they were able to really understand and act on our desire for an audio experience that is best described as "engaging",' concluded Mr Corder. 'No room is perfect, but the combination of the room design and the K2 is a great balance where the PA is supporting the room and the room is supporting the PA.'

www.gochristfellowship.com
www.l-acoustics.com
www.mankinmedia.com

Equipping the Jammoum Mosque

SAUDI ARABIA: The newly built Jammoum Mosque in Al Jumum has been equipped with a Harman sound system by systems integrator, Ektar International. Located between Mecca and Jeddah, the mosque is the largest in Al Jumum, accommodating more than 10,000 worshippers and spanning two floors with a 36m x 64m footprint.

Jammoum Mosque's architecture has resulted in some highly reverberant spaces. To take care of this, the Ektar team, including executive director Muammar Al Harbi and project manager Khaled Bouajaja, who oversaw the sound design and system installation, made use of a frequency analyser and a sound meter during the design process to increase the sound frequencies and lower reverberation times.

'The audio distribution was calculated according to the architectural materials and forms of the mosque, providing direct listening conditions and a unique "voice" for each zone,' explained a spokesperson for Ektar. 'All speakers face in the same direction and the audio delays are configured to broadcast sound simultaneously.'

Over the course of seven days, the Ektar team installed a total of 54 JBL Control 25 speakers and six CBT 100LA-LS line array column speakers throughout the facility. Three of the CBT 100LA-LS columns were placed on the ground floor at the front of the mosque with 26 of the Control 25s. The remaining three CBT 100LA-LS cabinets and 24 of the Control 25s can be found on the upper level. The additional

Installation of the external horn speakers

four Control 25 speakers provide reinforcement in the women's hall.

In addition to the speakers, a Dynacord CMS 1600 mixer was installed along with four PCL 1240T amplifiers that control and power the sound setup, respectively. Six DL 2/918 delay line controllers from the t.racks are used for ensuring the delay speakers emit audio without an echo. Meanwhile, vocals and speech are captured by six AKG C535 EB reference handheld condenser microphones, three GN30 ESP goosenecks and a pair of PCC170 boundary layer microphones.

As well as curing the reverberation issues inside the mosque, Ektar International was contracted to install a CCTV setup inside and out, and horn speakers outside. Across the entire site, the team installed 24 Hikvision CCTV cameras inside the mosque and 10 outside it. Installing horn speakers was a challenge as they were placed up on the minaret at varying heights with a delay to not muddy their intelligibility.

www.ektar-avl.com

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Amplifying Knoxville's Most Sacred Heart

USA: The Cathedral of the Most Sacred Heart of Jesus recently opened its doors. Accommodating more than 1,300 congregants, it supersedes Sacred Heart Cathedral as the cathedral for the Diocese of Knoxville. Acoustics were not forgotten during the construction of the new building, as AV systems integrator TSAV worked with architectural firm BarberMcMurry and all other parties involved to ensure clear sound within the space. TSAV also installed a Danley Sound Labs J3-64 Jericho Horn and four Danley SM80 loudspeakers for fills to reinforce musical content.

'We were brought in early and contributed our expertise to programmatic and acoustical design,' said Keith Reardigan, TSAV's VP of technology and standards, and senior systems architect. 'For example, we were able to suggest acoustical treatments that would nicely balance the often-conflicting needs for intelligible spoken work and lively music. Whereas an untreated room of comparable size might normally have 6–8s of reverb, we brought the Cathedral of the Most Sacred Heart of Jesus down to around 2s when empty – enough to really help with intelligibility but not so much as to spoil the music.'

Mr Reardigan and the TSAV team designed the sound reinforcement system to keep the direct path of audio confined to listeners, avoiding the reflective surfaces in the spacious room. The Danley system was installed at the back of the room, hidden below the choir loft.

'We knew we didn't want to excite a lot of air and surfaces unnecessarily,' he explained. 'We've completed several projects that had that same imperative with Danley Sound Labs loudspeakers, and we've been impressed with the Danley design's ability to deliver a coherent waveform over long distances and its related pattern control.'

A single Danley J3-64 Jericho Horn covers the majority of the seating area. This model of speaker is often used in large stadiums and, therefore, only one was needed to near-fill the cathedral. Two of the SM80s are used for near-fill and the other pair are split between the two transepts. The system is driven by QSC amplifiers and Biamp DSP. Speech is amplified by a Bose column array system at the front of the church coupled with K-array micro-format speakers that have been integrated among overhead lighting fixtures. Both the music and speech systems are controlled from a Yamaha QL console with custom Crestron controls.

www.danleysoundlabs.com
www.shcathedral.org
www.tsav.com

Wavefront Precision on Mount Hebron

USA: Mount Hebron Church in Mobile, Alabama has been equipped with a Martin Audio Wavefront Precision line array system as part of a recent upgrade project. The system was installed by local firm Vision Integration.

'Mount Hebron originally had an exploded cluster PA system that just wasn't working for them,' explained Gary Baria of Vision Integration. 'The pastor and praise team were looking at other systems but we recommended Martin Audio Wavefront Precision Mini line arrays. The WPM system had a nice clean look and exceptional intelligibility – something they didn't have with the previous system – and gave their audio staff a system that sounds great without having to do a lot to it.'

The system installed comprises eight flown WPM cabinets on each side of the stage with four CDD6 enclosures employed as front- and side-fills. Low-frequency noise was catered for with two SX218 subs stacked on the ground to the left and right of the stage. On the stage, four LE200 wedges form the monitoring setup. The entire system is powered by iKON iK42 and iK81 amps.

The church runs contemporary worship services with a praise team that consists of two keyboard players, a guitarist, bass player, percussionist and drummer, with between eight and 12 vocalists using wireless mics that alternate with a 30-piece choir. 'The system had to be multifunctional and work for music reproduction and speech for the sermons as well as a special day-care service for kids with videos, and broadcast because the church also streams the services, all of which have been more than fulfilled with the WPM system,' said Mr Baria.

Completing the new audio system are Allen & Heath dLive consoles for FOH, monitors and broadcast. The video system, meanwhile, comprises a Panasonic 4K premium camcorder, three Panasonic 7,200 lumen DLP laser projectors and a PTZ 12x optical zoom camera, while a Blizzard system has been implemented for lighting.

www.invisionav.com
www.martin-audio.com
www.mthebroncm.org

New wireless coverage across Cherry Hills

USA: Cherry Hills Community Church is an Evangelical Presbyterian megachurch with a mammoth, ¼-mile-wide campus to the south of Denver. In order to comply with the FCC's (Federal Communications Commission) new rules regarding 600MHz band wireless, the church upgraded its site with a fully networked system, investing in Lectrosonics Digital and Digital Hybrid Wireless solutions for integrating digital wireless microphone and in-ear monitoring (IEM) systems.

'We've been on the update path since I started a few years ago,' said the church's audio director, Ben Edison. 'We updated the sound system to L-Acoustics Kara speakers. We upgraded our DiGiCo consoles to Stealth Core and upgraded our I/O system to SD-Racks. And now we've flipped all our wireless gear to Lectrosonics.'

The Lectrosonics equipment installed at Cherry Hills includes Venue 2 receivers, SSM micro bodypack transmitters, 24 LT bodypack transmitters, 32 HHa handheld transmitters and 14 channels of Duet IEM systems. These have been integrated across four locations on campus. The HHa handhelds are all equipped with either Shure KSM9 or DPA d:facto capsules.

'The number one driving force was the Duet in-ear monitoring system,' explained Mr Edison. 'We've been on in-ears for a couple of years, with no wedges on stage. We do feature a choir once every other week, and we have wedges in the ceiling for the choir, but the band is all on in-ears.

'We knew that if we were going to pull the trigger on new equipment then we really wanted it to be digital. You get one chance in 10 years to do a big update in a church, so we wanted to make sure that we adopted the technology now. We put in 21 channels of Venue 2 and 10 channels of Duet into the 3,500-seat worship centre. The chapel, which seats 350, got 10 channels of Venue 2, the 600-capacity atrium got 10 channels and the youth group room got 12 channels, with 10 Duet in-ears.'

In addition, a single WM watertight bodypack transmitter was purchased by the church. 'We haven't used it yet,' Mr Edison admitted. 'But we do outdoor events in the summer, mainly baptisms, so we're going to use it in a baptism tub. Plus, it's a utility piece for anyone doing anything in the kid's room or needs a device they can get wet. I'm excited to use it.'

While the upgrade was triggered by the loss of the 600MHz band, Mr Edison notes that the primary motivation was the Duet 2 digital IEM system. 'We have two cell towers on our building, and one of them is T-Mobile, which owns the 600MHz band, so we had to make sure and get out of those frequencies early,' he concluded. 'The Duet 2 digital IEM system was the big tipping point and made us look into Lectrosonics a lot more. After doing a lot of demos and some listening tests, we decided that we were definitely going to go Lectro.'

www.chcc.org
www.lectrosonics.com

DPA Microphones' House of Worship Tour

The Danish mic manufacturer recently visited a pair of US churches to educate HOW technicians. **James Cooke** reports

DPA MICROPHONES RECENTLY deployed a team to deliver educational seminars at the National Community Church in Washington, DC and the Queen City Church in Charlotte, North Carolina in what formed the first leg of its House of Worship Tour.

'DPA is an ideal solution for miking worship leaders, speakers, singers and instrumentalists as well as live streaming or broadcasting sermons,' explained Christopher Spahr, the manufacturer's VP of sales and marketing. 'The first leg of the tour allowed us to travel to regional churches to educate HOW professionals about our solutions and how our mics can help worship services deliver the best sound for any meaningful message.'

Attendees at both events were taught best practices for miking drums, guitars and horns, among other instruments and vocals, as well as troubleshooting techniques. In addition, the entire DPA product catalogue, including the newly launched subminiature line of d:screet and d:fine lavalier and headset microphones, was on display.

After an overview of the products on show and their applications, those in attendance at each session were treated to live band performances with various miking techniques employed to better demonstrate the microphones in a real-world scenario. The attendees were even given the opportunity to get hands-on with the kit and to practise the techniques shown. Shootouts between various microphones allowed participants to hear the difference between certain models. The events concluded with a DPA Masters Q&A.

'DPA is known primarily for making the best-sounding headsets, and we are heavily used in houses of worship,' said DPA Microphones' sales manager, Alan Johnson. 'However, we take that same quality and make lots of other microphones that churches can use. We make instrument, choir and vocal mics that I believe can all help support houses of worship in getting their messages heard. So, we created our House of Worship Tour to give hands-on education and experience of our products, make it accessible to any HOW audio technician, from the volunteer to the journeyman to the seasoned engineer, and take it across the country to give everyone a chance to experience pure sound.'

The National Community Church in America's capital city was the first stop of the tour. Kent Margraves, Chris McMillan and Kevin Sanchez, three prominent sound engineers with strong ties to worship, were on hand to share their knowledge gained over the course of a combined 60 years in the industry. Mr Margraves has served as an audio director for two megachurches, toured as a concert FOH mixer and currently mixes for several worship artists, including Elevation Church. Mr McMillan recently finished a four-year gig handling the live production and mixing responsibilities for his brother, Christian singer–songwriter John Mark McMillan. Meanwhile, Mr Sanchez is an experienced audio engineer, sound designer and technician, who has worked with artist and worship leader Lindy Conant, as well as the worship band Housefires.

At the Queen City Church session in Charlotte, Daniel Rivera and Jarred Venter joined a returning Mr McMillan. Mr Rivera works in sales and business development for Meyer Sound, overseeing the HOW market, while Mr Venter started out as a volunteer with Hillsong Church South Africa and has served as the FOH engineer for Christian artists Kari Jobe, Lauren Daigle and For King & Country.

'We chose to debut the House of Worship Tour in DC and Charlotte and had more than 45 people come to the events,' Mr Johnson concluded. 'These events are a great place to ask questions, meet others and learn from industry experts as well as from each other. We're excited to see what 2019 holds as the tour continues.'

'These sessions were designed to be pilot events,' added Evan MacKenzie, DPA marketing and communications manager. 'We wanted to learn what the HOW market is interested in when it comes to microphone techniques in worship services and their applications of our microphones. We will embark on next year's tour with a more specific and targeted experience for the HOW market based on what they have told us.'

www.dpamicrophones.com

Alan Johnson

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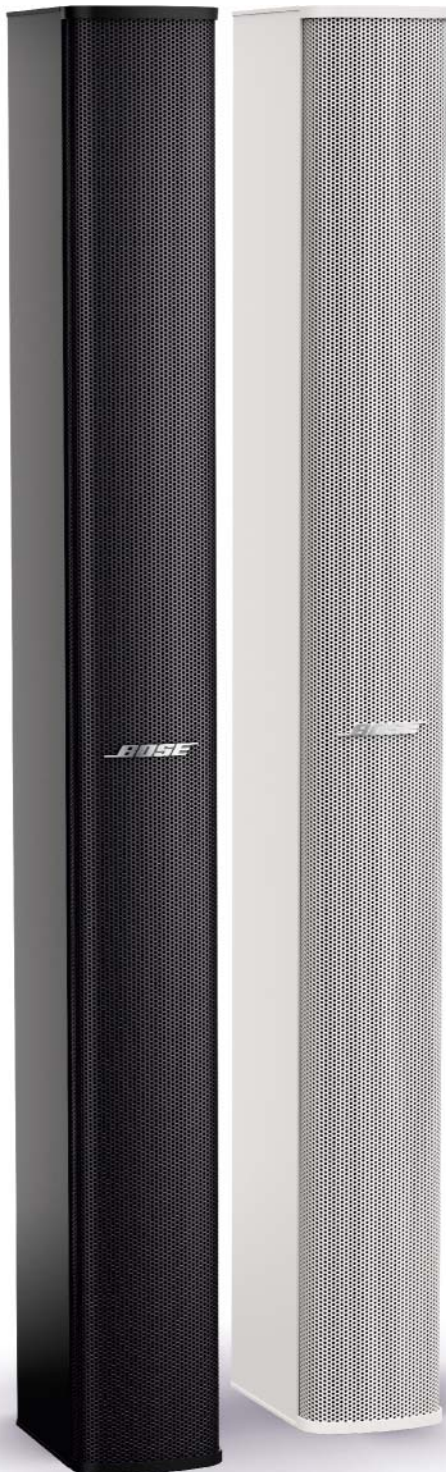
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Providing intelligibility of speech under the dome is paramount

Imam Fahmi can recite the entire *Quran* by heart

L-R MA12EX Panaray column speakers are fixed to rising columns by Bi-Pivot brackets

Consistency and intelligibility under the dome

Richard Lawn discovers how one Singaporean imam has brought his experience of Bose loudspeakers in Mecca back to his Hougang mosque

HAVING BEEN RAISED ON THE Indonesian island of Lombok, Fahmi Hamdan Ali spent 11 years furthering his faith of Islam in the holy city of Mecca. Having learnt to recite the entire works of the *Quran* by heart, the devout Muslim is today the renowned resident imam at the En-Naeem Mosque in the Singaporean suburb of Hougang. Here, he critically monitors his own vocals relying on the assistive listening of AV Links Communications [Asia] team engineers.

During his time in Saudi Arabia, Imam Fahmi gradually became more accustomed to the qualities of Bose loudspeaker performance. 'I was particularly impressed with the clarity and intelligibility of their speakers,' comments the resident imam. 'In Mecca, Bose was the benchmark and I learnt to distinguish the difference between their speakers and other brands. It's important that I protect my voice, so I need to accurately hear it.' Having earmarked an audio upgrade for the mosque, Imam

Masjid En-Naeem is a commanding landmark in the Hougang suburb

Fahmi requested a demonstration from Bose supplier and SI, AV Links Communications.

'Other engineers find it difficult to interpret my terminology, but the team engineers at AV Links Communications fully understood and appreciated the vocal projection I required for my sermons.' Suitably impressed by the clarity of a Bose Panaray loudspeaker system during the demonstration, the mosque was supplied with a partial Panaray system for further evaluation over the course of several weeks. During that time, Ham Dan and his team of engineers were frequently requested to fine tune the system and provide expert analysis for the imam. 'My phone would sometimes ring in the middle of the night,' laughs Ham Dan. 'If I sent my team engineers, however, Imam Fahmi would insist I return.'

Imam Fahmi needed to have his request for the upgrade approved by the mosque committee. 'Overall, price was probably the most important consideration. I explained that the added cost of a Bose system was a good long-term investment both in terms of sonic quality, even dispersion and protecting my vocals.' The committee approved his request and, following simulation analysis using the Bose Modeler software, AV Links Communications engineers, headed by Mohd Firdaus Lam Bin Yismin Lam who holds a BSc in audio engineering from the University of Highlands and Islands in Scotland, set about designing and then installing the components of the Bose Panaray and FreeSpace loudspeaker system into the worship space.

'Despite it being a Bose system, I could keep the design within

Bose Professional's Yusof Ahmad and AV Links Communications' Ham Dan with Imam Fahmi

budget as these speakers provide a wide coverage area ensuring fewer speakers are required,' explained Ham Dan. Delivering 160° wide horizontal coverage with a narrow 20° vertical pattern control, L-R MA12EX Panaray column speakers are fixed to rising columns by Bi-Pivot brackets on the ground floor and balcony. Combining 12 2.25-inch drivers, the speakers are tailored for this low-ceiling application, improving the throw distance while reducing ceiling reflections.

The peripheral areas are adequately served by 12 DS40F 4.5-inch ceiling speakers that provide a 125° conical coverage pattern. Higher SPLs were required for the central worship space immediately under the dome

and this has been catered for by wall-mounting two DS40-SE and four DS100SE cabinets at a 3m height. By sharing identical voicing components and characteristics, the FreeSpace speaker models provide a consistent tonal quality within the mosque. A single PowerMatch PM-4250 4-channel amplifier powers the zone featuring the MA12EX models, while four FreeSpace IZA 2120-HZ 2x120W integrated amplifiers cater for the DS 40F and DS 100SE low-impedance models located in the other four designated zones.

A 16-channel Soundcraft Signature 16 analogue console receives inputs from various Shure SM58S handheld microphones used for

Fajr, Dzuhur, Asar, Maghrib, Isyak and Kuliah prayers. Digital audio processing settings for the imam for the six prayers have been individually configured and stored in a Bose ControlSpace ESP-4120 4x12 fixed analogue processor which comes with an 8-channel ESPLink output. Although the call to prayer changes little in an equatorial country, the different daily settings still required tweaking and storing in the ESP-4120. Located in the rear changing room where the racked equipment is also based, a wall-mounted Control Panel 7 and Pro controller from Australian manufacturer CommBox provide an on/off switch, individual presets for the six prayers and Friday prayer settings.

Audio effects processing has also been applied to the selected microphone channels through a Lexicon MX200 Dual Reverb FX Processor set to large hall/arena for some natural reverb. Two Furman PS-8RE III processors provide surge protection and electronic sequencing when powering on and off.

'The imam is very sensitive to changes and insists on volume levels being consistent and that no one tampers with the settings,' furthers Ham Dan. 'During Ramadan, he recites the entire *Quran* over 30 days,

Four FreeSpace IZA 2120-HZ models and a single PowerMatch PM-4250 amplifier power the Bose speakers

during which time he has to take particular care of his voice.' Fluent in three languages, Imam Fahmi demands consistency of speech. The various Bose loudspeaker components specified, tuned and installed by AV Links Communications has achieved that while providing the worshipper with an enhanced service.

www.avlinkscomm.com
www.pro.bose.com

The rise and fall of reverberation at Gustav Vasa Kyrka

When refurbishment works increased the already high reverberation time at Gustav Vasa Kyrka, Sound Cop was on the case. **James Cooke** investigates

HOUSES OF WORSHIP EXCEEDING 100 years in age can easily be forgiven for high reverberation times. For the most part, they were built to please the eye rather than the ear. As late as the 1900s, there was little thought given to reverberation when architecting a church and, if there was, high reverberation was sought to carry preachers' voices throughout a sanctuary prior to the invention of the loudspeaker.

One of Stockholm's largest – and most eye-catching – churches is Gustav Vasa Kyrka. It was designed by architect August Lindegren in 1906 with an ornate dome and cupola reaching for the heavens 60m in the air with support from four pillars. Inside, there is room for up to 1,200 worshippers, who are greeted by the church's Baroque Revival-style aesthetic. This includes detailed marble surfaces, high arches and an extravagant 18th-century altarpiece.

The sanctuary recently underwent some refurbishment work, which included upgrades to the technical equipment employed. One aspect of this saw sound level management consultancy Sound Cop brought in to solve the intelligibility woes that have plagued Gustav Vasa Kyrka throughout its history.

'The acoustics were the biggest challenge,' says Sound Cop's Jacob Julin. 'When we started, the hall had an acoustic reverberation of 6s, so that was of course an issue.'

While a 6s reverberation time already posed quite a challenge for Sound Cop, the building's refurbishment works, such as new treatments to the floor and walls, increased this to a staggering 7.5s.

'I've done gigs in similar environments, but never an installation,' Julin states. 'The worst of the reverberation is between 300Hz and 500Hz, so it is possible to improve it with a little bit of a

A variety of xS-Series enclosures can be found around the sanctuary

system trim, but the reverberation is very long in full frequency as well.'

Gustav Vasa Kyrka is part of Svenska Kyrkan (the Church of Sweden). Working for the church as facilities manager is Urban Paulander. 'Most of what needs to be amplified is speech, the choir and classical music, but also sometimes classical chamber music,' he explains. 'Then, around Christmas,

we host pop and jazz Christmas concerts. What we wanted was a system that would make speech and music as clear as possible for all listeners in all areas of the church.'

Taking into account the various types of sound that the church required a new audio system to accommodate, Julin and the Sound Cop team recalled a similar project the previous year

at Stockholm's Maria Magdalena Church, where they had installed d&b audiotechnik xC-Series column loudspeakers to much success. Figuring that the cardioid dispersion of the xC-Series would help to reduce the unwanted reflections inside Gustav Vasa Kyrka and maximise intelligibility, Sound Cop acquired a new system through the German manufacturer's Swedish distributor, Arva Trading.

'The 24C was the obvious choice,' says Julin. 'I was worried that it wouldn't cover the 19m throw distance to the delays, but it worked straight away.

'I've chosen the xC-Series for a while now because they're the only column speakers that actually sound like a small PA,' he claims. 'I listen through a lot of column speakers, and some use beam steering, but most only give me a headache because they're not phase-coherent.'

Sound Cop installed one 24C loudspeaker on each side of the

Refurbishment work increased the reverberation time to 7.5s

front of the room, as well as two d&b 4S compact speakers that point in towards the altar. Meanwhile, a pair of 16C speakers point back to the presenter's position for foldback.

'On one of the pillars there is an organ that is totally in the way of everything,' adds Julin. 'If we put a speaker there, no one behind it would hear anything. So we made 80cm wall-mount arms to hold the speakers out on each side of the organ. At first, I thought it might be ugly, but some really talented people painted it and it melded really well with the organ, so you don't think about it at all.'

Around the pillars are 24C, 24C-E plus 4S cabinets from d&b's xS-Series, which cover the balconies. Underneath, further 4S cabinets deliver under balcony-fill, while

additional 16Cs on the pillars deeper into the room serve as delays. A separate 16C system was also installed in one of the side chapels.

The setup is powered by eight d&b 10D amplifiers, while a pair of DS10 network bridges offer digital networking capabilities through a Yamaha Rio3224 I/O unit. A QSC Q-Sys Core 500i processor provides control at the priest's position and at FOH via touchscreens. This allows the priests to select their own microphones. Two Q-Sys Page Stations were included in the installation for use in emergency evacuations.

In total, more than 30 speakers were installed and these are managed by a Yamaha QL1 digital console at the FOH control position. 'Every speaker is on its own channel to allow us to time align everything,' notes Julin. 'There are two DS10s to get the audio from Yamaha and Q-Sys via Dante and distribute it via AES to the amps.

'We have also made very good use of the d&b plug-in for Q-Sys. It gives the user easy control of zones, by selecting areas of the room on a plan view map on the touchscreen. This mutes or unmutes the different areas. All EQ and delay are done with d&b's R1 remote control software. The user has a choice of controlling

events either via the programmed touchscreen connected to the Q-Sys Core or via the QL1.'

Paulander is happy with the results produced by Sound Cop and the xC-Series setup. The reverberation time, having risen, has now fallen. 'It's a very good system; the sound is much, much better than before,' he says. 'The control interface is both advanced and simple, which is great because we have staff with different levels of knowledge in sound and mixing.'

Julin credits the xC-Series loudspeakers with bringing the reverberation time down and increasing intelligibility while keeping to aesthetic guidelines set out by Svenska Kyrkan.

'Quality-wise, the xC-Series loudspeakers were everything to this project,' concludes Julin. 'I don't think it could have had this quality without that product, at least not with the visual demands. There was no way we could have used anything else – nothing that stays coherent at least. In my next church project, I'm pretty sure I will use the same solution again because it really works.'

www.dbaudio.com
www.soundcop.se
www.svenskakyrkan.se/gustafvasa

Mixing a live service at Willow Creek Community Church

Two RedNet MP8R mic pres in a rack at Willow Creek Community Church

FOH at Redemption Hill Church

The portable Roland electric drum kit

Upwardly mobile

Practice makes perfect at RHC in Singapore, where the production team has got their service set up down to a fine art. **Richard Lawn** pays a visit

REFERRING TO THE MOUNT WHERE Christ was crucified, the name Redemption Hill Church (RHC) has since been adopted by many churches around the world. Redemption Hill Church in Singapore is located on the fifth level of the Furama City Centre Hotel, although during weekdays you're more likely to encounter a corporate event or private function as the 580m² ballroom is a hired venue. With a scarcity of land available to build a permanent home in the Lion State, lead pastor Simon Murphy and the other church elders decided to take up residence within the hotel for the next season.

Founded in 2008, the church is becoming resigned to the fact that finding a permanent home in Singapore may take many years. 'The church approached me in 2014 to help them with their AV as they were looking for their own premises back then,' commented HOW AV consultant, Robert Soo. 'Over the four ensuing years, they found nothing in terms of cost and sustainability. When they announced that they would hold their services in a hotel ballroom for the immediate

An L-Acoustics Arcs Wide and Arcs Focus speaker system is best suited for the low 3.8m ceiling

future, I was surprised as it leads to complications in terms of who pays for what.'

Despite the word of caution issued by Soo, the hotel and the church are working in unison together. Built in 1982, the pillarless ballroom was equipped with a dating speaker system built into its low 3.8m ceiling. 'I proposed that the church should try and co-own an audio system for their musical services as this would also benefit the hotel and appeal to clientele wanting to host live music.

The Furama City Centre Hotel was open to this suggestion and, as such, we approached a number of loudspeaker vendors to demonstrate their systems in this challenging space.'

Ultimately, an L-Acoustics Arcs loudspeaker system proved to be best for the venue as well as their style of music. 'Systems integrator PAVE fully understood the nature of the room and their Arcs Wide and Arcs Focus configuration provided the best in terms of even coverage,

intelligibility, musical quality and power handling,' furthers Soo. Given the layout of the 500-capacity ballroom, aesthetics and operational requirements were considerations that had to be factored in. 'Owing to the low ceiling and wide layout of the room, the close proximity of the congregation to the stage, plus the need to divide the ballroom into two operationally independent spaces (operable wall in the middle), the loudspeaker configuration consists of four very carefully positioned and angled loudspeaker clusters that provide very even sound coverage and high gain before feedback.'

The successful design consists of one Focus and one Wide cabinet suspended horizontally together with a single 18-inch SB18 subwoofer behind them on the same WiFoLift rigging element for low-frequency extension down to 32Hz. Operating within a 55Hz to 20kHz frequency range, the identical physical footprints of the Focus and Wide cabinets allow them to be arrayed together. They differ in the fact that the Wide cabinet offers 30° x 90° (HxV) coverage, while the Focus makes it more suitable on top with

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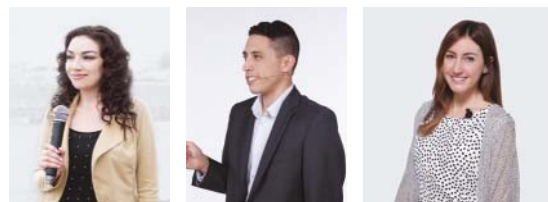
Samson Wireless Solutions for Worship.

Samson's professional wireless systems are widely used and trusted by houses of worship, schools and performance venues throughout the world. The meticulous engineering and state-of-the-art technology that goes into every Samson wireless system ensures that every word from the pulpit and each note played by the worship band is delivered with pristine clarity.

Samson **Concert 99 Frequency-Agile UHF Wireless System** was designed with houses of worship in mind. It provides crystal clear sound and is extremely rugged and reliable. The Concert 99 system is easy to use, even if you're not an audio professional, which is essential if you rely on volunteers and members of the congregation to run your sound system.

Available in four configurations (handheld, lavalier, guitar, and earset), the Concert 99 is perfect for all of your speaking and worship band needs. It offers 80 channels of clean audio and eight hours of battery life. This guarantees that you never have to worry about channel clarity or battery power during a service. It also allows you to use up to eight Concert 99 systems simultaneously (per frequency band).

Samson Concert 99 wireless system takes all the worry out of wireless and allow you to focus on delivering your message. Its easy setup, flawless operation and sound, makes it the most ideal professional wireless solution for all your house of worship needs.

SAMSON

the 15° x 90° (HxV) dispersion characteristics, ensuring the acoustic energies are not directed towards the ceiling.

Just three 4 x 1,000W LA4X amplified controllers provide sufficient headroom for all eight 450W RMS Arcs cabinets and four 700W RMS SB18 subwoofers. In addition, the three controllers come equipped with remote control and monitoring capabilities courtesy of the Cat-5 connection to the LA Network Manager 2.5.2 software including the latest 2.8.4 firmware and 5.8 preset library.

Set up for Redemption Hill Church's operations starts three hours in advance of the first 9.15am Sunday church service. Located on level three of the hotel, the church headquarters are home to 17 full- and part-time staff who perform a multitude of administrative, technical and theological tasks. The offices also include a purpose-built rehearsal space equipped with ceiling-suspended QSC K10.2 speakers and a Yamaha LS9 console, together with a storage facility for all the audio, lighting and video equipment used each Sunday.

The mobile setup mirrors a touring production facility rather than a HOW. It distinguishes Redemption Hill as a rather unique and somewhat committed enterprise that can easily adapt its style of service should it require to do so. Titus Tiong's (RHC's service operations manager) initial task each Sunday at 6.00am is to transfer the flight-cased Yamaha CL5 console up the service elevator and connect the Cat-5 cabling to the Rio3224-D audio input–output box on stage. The 32 microphone inputs are more than sufficient for the worship leaders, singers and musicians. With the addition of a Cisco SF302-08MP switch and the MY8-AE and MY16-AT cards inserted respectively into the rear of the console and I/O box, a

SB18 subwoofers provide low-frequency extension down to 32Hz

Dante network is established with the L-Acoustics speaker system via the LA4X amplifier controllers. Audio signals can also be routed to the Cry Room and the level-three facilities.

'As we are simply one user operating in a multipurpose venue, it's important that we minimise the amount of equipment needed each Sunday and that it can be easily set up,' comments Tiong. 'Since we started employing this setup in late 2017, we have sped up a lot and further simplified it over time.' While Redemption Hill's system operates over the Dante digital network, the hotel ballroom is served by an analogue setup. However, with the addition of a Yamaha MRX7-D processor, digital control has been enabled, providing four user presets via a rear wall controller.

All the equipment is flight-cased including the portable Roland electric drum kit and the keyboard. Equipped with wheels, these mobile stages were custom-designed and built to affix to the front of the stage left and right locations. Crucially, their dimensions had to fit within the service elevator allowing for transfer. A brake-lock mechanism ensures they stay in position once set up. A Radial Pro D8 direct box connects

The Yamaha CL5 console at FOH is rolled in and out each Sunday

the mic inputs from the drum kit to the Rio3224-D, while two Radial J48 DI boxes connect the keyboards.

Two mobile lighting bars remain in the ballroom at all times and are populated by eight EK Lighting 18QX RGBW LEDs and four Silverstar Frenzo ZE2 Fresnel LEDs taken out from storage each Sunday. Simplified lighting management is provided by a ChamSys MagicQ controller set up next to the Yamaha CL5 console at the rear of the ballroom. 'Setting up the lighting bar initially took us some time to master, but now we simply raise it into position and fix the lights,' furthers Tiong.

For its visual requirements, the church prefers an SDI signal path, while the hotel continues to operate over a VGA network. The divisible ballroom is equipped with two electrified L-R screens should a partition be required for separate events. This is ideal for Redemption Hill's needs as they simply patch into the installed video infrastructure in order to display lyrics and images during the three, 90-minute services. Therefore, the main addition required for full video production is a Datavideo SE-2200 switcher. This accepts up to six PC and camera inputs prior to output on the overhead projectors, while a Kramer VP-200K serves as a distribution amplifier for

the computer graphics and Datavideo DAC-60. In addition, DAC-8P units provide HD/SD-SDI to VGA and SD-SDI to HDMI video signal conversion.

Ensuring a clean appearance on stage, monitoring is exclusively an in-ear setup. While the worship leaders and singers prefer a Shure PSM 1000 diversity wireless system combining P10R and P10T bodypack receivers and transmitters, the musicians benefit from myMix personal monitors connected to an IEX16L-A 16-channel input expander. Five channels of Shure QLXD4 wireless are available for which the singers and worship leaders use Beta58 handhelds, while Pastor

Simon conducts his sermons via a clip-on WL185 lavalier condenser. Eight iOS tablets are used by the musicians and singers on stage, negating the need for physical printed scores. These are downloaded with the OnSong App, which not only synchronises chords and streamlines performances, but it also allows the worship leader to update a song during the service.

'We were initially worried that the weekly transformation set up prior to Sunday services would be too much for our volunteers,' Tiong confesses. 'However, our continued dialogue with Robert and then PAVE really put our minds at ease. Stephen Teo and the PAVE team fully understood our requirements and created a system we are more than happy to operate. When you're having to set up and dismantle a full AV and lighting system, it's paramount that you minimise the equipment required and that it all serves a purpose.'

Now fully experienced and rehearsed in their Sunday operations, the time needed to prepare has reduced sufficiently to allow a window of opportunity for breakfast ahead of the first service.

www.cogentacoustics.com
www.pave.com.sg
www.rhc.org.sg

Two mobile lighting bars remain in the ballroom at all times

Steering the course of history

While churches such as Kirche St Peter und Paul can stand for centuries, audio technology can need replacing after a matter of years. **James Cooke** reports

WITH HUNDREDS OF YEARS OF history behind it, Kirche St Peter und Paul (St Peter and Paul church) in the Swiss village of Küssnacht am Rigi underwent a series of renovations, inside and out, between 1994 and 1997. This included the installation of a speaker system that has dated in this otherwise timeless house of worship.

'The old, decentralised sound system caused problems,' explains Hansjörg Bruggmann, who is responsible for the building maintenance at St Peter and Paul. 'The components also no longer corresponded with the newer pieces of art and decoration that had been put up, and the sound emitting from these speakers was often unintelligible in this reverberant sanctuary.'

The current Baroque-style church, which stands out on the Küssnacht am Rigi skyline today, was designed by Father Marquard Imfeld and built between 1708 and 1710. The original Romanesque building that once stood in its place, according to the record books, dates back to 1036 and was replaced by a Gothic-style sanctuary sometime during the 15th century.

In 2018, it was only the sound system that needed replacing though.

'The existing system was about 20 years old and people had often complained about the sound quality,' confirms Pascal Luder, Fohhn product manager at Sennheiser (Schweiz). 'Auviso AG was approached by the church to design a new system and they included Imhof Akustik in the project, which took responsibility for the installation as an expert and free consultant.

'Since Fohhn was on both Auviso's and Imhof's lists of preferred suppliers, Sennheiser came up with a product recommendation built on experiences gained from installations in comparable churches.

We then organised a live demo with these products where all visitors were asked about their listening experience to further verify the church's investment.'

'Auviso were professional and transparent in their consulting services,' says Bruggmann. 'Meanwhile, Imhof Akustik are an engineering firm with many years of experience in the field of church acoustics and, having served as a specialist planner during the previous installation at Kirche St Peter und Paul, it made sense for us to work with them again.'

Linea LX-100s cover the two galleries up high

The preacher's voice is captured by a Sennheiser MZH 3042 gooseneck with ME 35 capsule

A successful demonstration led to the installation of two Fohhn LFI-350 steerable line array speakers as the main PA system. Finished in white and hung at a height of 3.5m, they can be found to the left and right of the steps separating the main nave from the choir. The beam configuration has been set specifically to avoid unwanted reflections from the walls and the floor.

A pair of Linea LX-100 mini line array systems serve as delays, while another four have been installed to cover the two galleries, and the choir area is reinforced by two LX-10 compact loudspeakers. A Fohhn D-4.750 DSP-controlled Class-D amplifier powers the passive Linea LX cabinets.

'The new Fohhn system doesn't even compare to the old system,' exclaims Bruggmann. 'It seems that there has been a lot of development in loudspeaker technology over the last 20 years. The old loudspeakers were configured to cover relatively small listening areas that overlapped acoustically. The spill caused a complete mess.

'The new main loudspeakers fill more than 75% of the nave and are backed up by speakers between the clay pillars throughout the sanctuary. Of course, these speakers, as well as the speakers in the galleries, have been timed as delays to the main speakers to prevent overlapping.'

Bruggmann also reports that the precise planning undertaken by Imhof Akustik and Auviso, aided by the former's previous experience at the church, resulted in a timely installation en route to solving the acoustic challenges. 'The sound issues plaguing this big church were solved by selecting the right loudspeakers for the front of the church – the Fohhn LFI-350s. The church can accommodate approximately 1,000 people and, in addition to regular services, it hosts marriages, funerals and other ceremonies. There are also concerts and other events. The new sound system is well-equipped to handle all of these applications.'

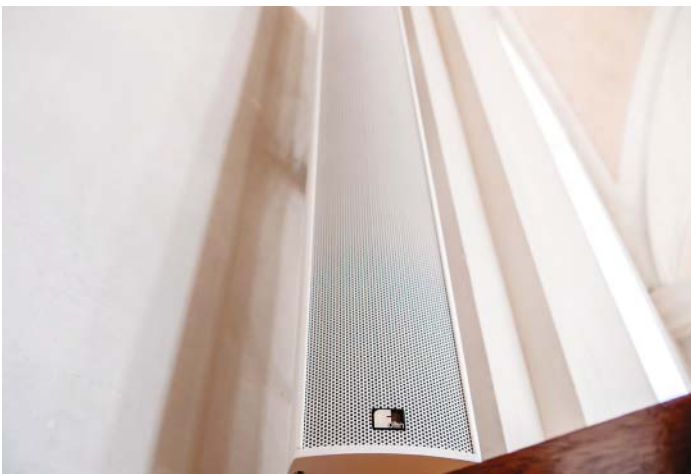In less than two decades, Kirche St Peter und Paul will have existed for an entire millennium in one form or another. The new Fohhn speakers and their beam-steering capabilities certainly appear to be helping navigate a new chapter in the church's history.

www.auviso.ch
www.fohhn.com
www.imhof-akustik.ch
www.pfarrei-kuessnacht.ch

LFI-350 steerable line array speakers form the main PA system

Time for T

Singapore's SJSM churches required an urgent upgrade of their analogue point source audio system. **Richard Lawn** takes a tour

AT WHAT POINT DOES A PASTOR, a musician or a volunteer technician call time on an audio system that is letting them down? Perhaps, some churches count down the installation of their next renewal on a set date 3,652 days into the future. Most likely, the pastor will be aware that the congregation is either not paying attention to the sermons or the audio volunteer has declared that there are no parts for the long-serving speaker system. At that point, the committee is made aware of the need and a plea for a budget is made.

Through organic growth, the Singaporean churches of St John's and St Margaret's (SJSM) were merged in 1971, relocating to a sanctuary inherited from the British Army. Serving the Dover community, the combined congregation hasn't stopped growing in size over the past five decades. Although the current services blend traditional worship with some contemporary expressions, the musical element has increased, with more musicians and a choir taking to the stage during the Saturday and
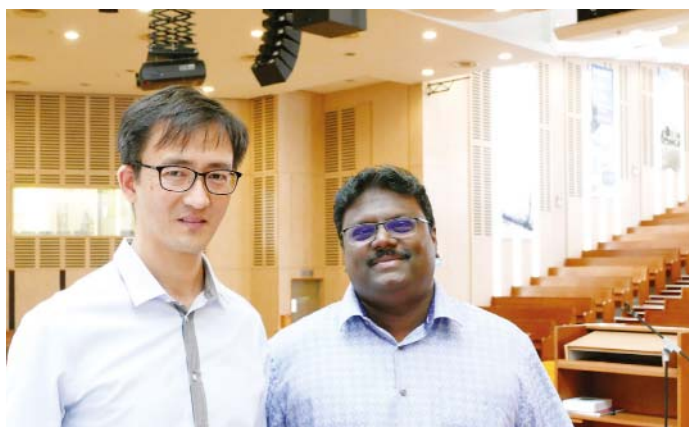
SJSM's communications head Nigel Sim and technical executive John Isaac

two Sunday services. The current Christ sanctuary building was finished in 2005 following the completion of the other facilities, including rooms for the junior church, counselling and Christian education. This phased approach over four years also supported the creation of multiple congregations and fellowships of different sizes, including Mandarin, Filipino, Tamil and Indonesian congregants.

While SJSM's 30-year lease is due to expire in 2022, a decision had already been made to upgrade the audio system within Christ sanctuary. In addition, SJSM had also taken the decision to develop an integrated multi-generation facility adjacent to the existing premises at 30 Dover Avenue. Project Spring-Winter (PSW) will comprise administrative offices, childcare and nursing home facilities together with elderly care

services when it finally opens in 2020. As such, any other budgets were scrutinised, needing to be fully justified.

The church committee decided in 2016 that, following gradual degradation, the previous analogue point source audio system required an urgent upgrade. The console's channel count was fully utilised, audio coverage across the sanctuary was inconsistent, spare parts were becoming harder to locate and some of the models had already been delisted.

'When certain components and replacement parts for the amplifiers and loudspeakers became increasingly rare, it became crystal clear that our system was on its last legs,' commented Reverend Joshua Sudharman. 'The writing was on the wall, so I gave the team a green light to call in experts who could help us test out new systems that would allow us to make a recommendation to the church council.'

A shortlist of suppliers was called upon for demonstrations to be

assessed by a panel including church dignitaries and volunteers alike, for which future-proofing was a dominant criterion. Taking a central role in all of this, Alan Mathews was called upon to provide his consultancy expertise.

'We had run out of spare channels on the analogue console for our additional needs,' comments technical executive, John Isaac. 'We simply were not set up for contemporary services with their higher SPLs and high-definition audio characteristics. The previous system prioritised intelligibility of speech and increasingly could not meet our needs for musical clarity and warmth.'

Following a formal presentation at the company's Singapore headquarters by Gert Sanner, a demonstration of the d&b audiotechnik T10L loudspeaker system was staged at the church.

After analysis of all the demonstrations, the panel was unanimous in selecting the T10L model for its upgrade. 'We had to justify the cost, but the intensity of musical performance it now provides in addition to clarity of speech ensured this. The SPLs were comfortable and provided enhanced clarity, resolution and coverage previously entrusted to fill speakers.'

Electronics & Engineering Pte Ltd was called upon to supply and install the new audio system into the Christ sanctuary. L-R arrays each comprise eight Ti10L compact polyurethane enclosures. The dual 6.5-inch woofers are arranged in a dipolar arrangement to enhance dispersion control, while the HF driver is attached to a rotatable waveguide with a horn and an acoustic lens. This provides a vertical line source with a 90° horizontal dispersion that is maintained down to approximately 600Hz, while the integrated lens in the front grille widens the HF dispersion in line array mode to 105°.

The lower frequencies come in the form of four 27A-Sub cardioid
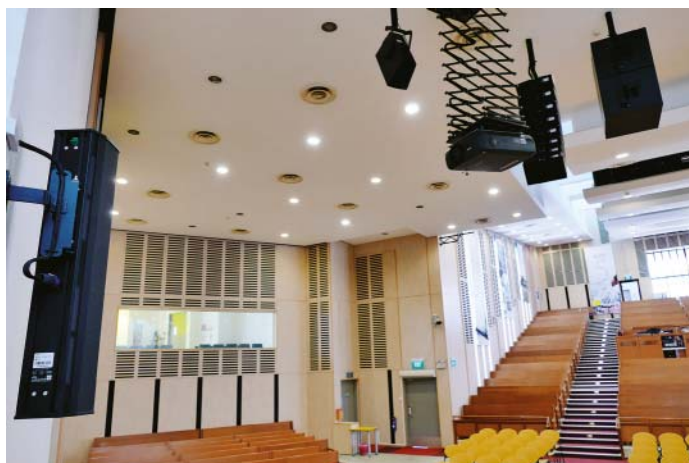
d&b audiotechnik loudspeakers fulfil stage left pastoral monitoring, side-fill and full-range FOH duties

subwoofers. Suspended from the ceiling adjacent to the Ti10L hangs, each cabinet houses 15- and 12-inch drivers in a two-chamber, band-pass design that radiates to the rear. Four d&b audiotechnik 10D amplifiers supply the 16 Ti10L cabinets, while a single 30D model is dedicated to the four 27A-Sub subwoofers. Each L-R wing of the sanctuary receives its own delicate mix from suspended d&b audiotechnik Yi7P dual 8-inch models to the left and right of the main Ti10L arrays. Serving as a pastoral monitor, the d&b audiotechnik inventory is rounded off with the inclusion of a 16C column loudspeaker. Finally, three rack-mounted Furman CN-3600SE power conditioners provide sequencing and electrical surge protection.

'The acoustic challenges in the corner wings perhaps posed the greatest problem in the deployment of the loudspeaker system,' comments d&b audiotechnik's manager, Kenny Chng. 'Prior to the upgrade, the church had experienced problematic build-ups of low- to mid-end frequencies and the mix appeared muddy. Having introduced d&b R60 processing through the 10D and 30D amplification network, this has been eliminated.'

The above-stage lighting incorporates Martin Mac 600s among spots, Fresnels and washes

'We are now blessed with a better sense of audio filling the space,' explains Isaac. 'It's not as patchy as the line array provides a much more even dispersion. Our volunteers possess limited experience, but we will continue to seek training opportunities for them and provide solid channels of feedback while using all this new equipment, to provide a seamless and satisfying worship experience for the whole church.'

The audio, lighting and visual technicians can control the services from their production area located in a central section of the sanctuary. Here, the DiGiCo SD9 console was selected for the church's combined FOH and monitor console requirements. 'It has a very intuitive layout providing a natural, clean mix for speech, playback and live sound. With help from Alan who

conducted training, our volunteers are now more familiar with mixing on this. We're future-proofed for some time and should have enough channels.'

Four Shure QLXD4 wireless channels have also been added to the mix providing the pastor and singers with their individual, handheld, head-worn and lapel microphone requirements. 'The frequency spectrum changed, so we had no alternative but to purchase new wireless mics.'

Over the year, front-row worshippers had commented on the spillage emitting from the stage, particularly from the percussionist. This has been mitigated by adding a drum shield and further extended with the adoption of myMix in-ear monitors for the musicians. The 13 units are fed via auxiliary outputs to two IEX-16L 16-channel live input expanders working together with a Cisco managed switch.

'The eight musicians and five singers have learnt how to adjust the effects and EQ individually on their units and they can now critically evaluate their individual performances after a service or rehearsal session and save these sessions as presets,' furthers Isaac. 'Our musicians have been provided with some training, to enable them to get more out of the IEMs and this has certainly helped them to hear themselves better on stage. Most importantly, the congregation now does not have overwhelming bleed from the band pit and can participate in the service more comfortably.'

Just as SJSM has phased its construction upgrades for the past two decades, technological upgrades within the sanctuary have adopted the same principle. As such, the ageing video projection system will be overhauled in 2019. Currently, wall-mounted PTZ cameras and a PC loaded with Pro Presenter 6 software combine images with lyrics, which are fed into a matrix supplying Sanyo projectors.

Naturally, as SJSM's new facilities come online, the addition of a Dante network for control and monitoring may be added to interlink much-needed overflow spaces during special events. Works in progress perhaps as the church continues to balance its books and enhance its services.

www.dbaudio.com
www.enepl.com.sg
www.sjsm.org.sg

The FOH production area

Scripting your service with lighting cues

John Black discovers the positive effects that a scripted service can have on the overall worship experience

REGARDLESS OF THE SIZE OF THE facility, the number of worshippers in attendance or the scale of your lighting system, most worship services are pre-planned, having one or more individuals decide on an order of events through the service. There may be elements that are decided on quite late, or there may be last-minute additions or deletions, but, for the most part, a service has a flow that is crafted to help guide the worship experience. As a result, lighting for worship services can very easily be scripted, which can have a number of positive effects on the overall experience as well as on the technical team operating the lighting system.

In this article, I'm going to discuss some of the ways that scripting a service with lighting cues can have a positive impact, as well as some steps and thought processes that I go through when planning and building lighting cues for my events.

Benefit 1: flow

Programming lighting cues is more than just creating a lighting look on stage and storing it for later recall. Lighting cues can contain information for fade times, the linking of multiple cues, timings for individual parameters such as movement or colour, and more. Lighting cues contain all of the information that has been programmed into palettes, presets and effects, and then brings them together into a sequence with transitions that can be crafted to enhance the flow from one service element to another.

This is one of the benefits of using cues to execute lighting during a service. Think about how you would feel waking up in the morning, sitting up in bed in a pitch-dark room when suddenly your toddler flips on the light switch. It's an uncomfortable feeling. Changing lighting states abruptly during a worship service can be uncomfortable and distracting and cause worshippers to lose focus from the experience. Instead, lighting cues can be programmed to create flow from one element to another in a way that encourages and promotes focus and the progression of the worship experience through the entire service.

Benefit 2: consistency

Many houses of worship host a number of worship services throughout a week. Some services may be of a different style or order, while others may be repeated to suit the time needs of various groups of worshippers. Using lighting cues builds consistency into the worship experience because the cues will play back exactly as they have been designed, programmed and rehearsed time and time again until a change is

MEET THE AUTHOR

John Black serves as the theatre manager for Seoul Foreign School in Seoul, South Korea. Holding a degree in Theatre Design, he provides technical production support and design in three state-of-the-art performance venues on campus for over 40 major concerts and productions a year in the areas of sound, lighting, video and staging. John especially enjoys sharing his passion for entertainment technology with high-school students each year through his student production team, *Crusader Live!*, giving students the opportunity to learn and work with professional-level technologies in a demanding production environment.

John Black, theatre manager for Seoul Foreign School

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made. This means that programmed elements can be well-thought through and designed in the rehearsal phase and then executed as expected.

Using lighting cues can also achieve consistency in that, sometimes, volunteer technical team members will change from service to service. It is not always possible to involve all technical team members in the programming and/or rehearsal process for a service. By using lighting cues, an operator can come in and either follow a programme order or script, or execute a lighting cue when directed by a technical director, and the result will be as planned.
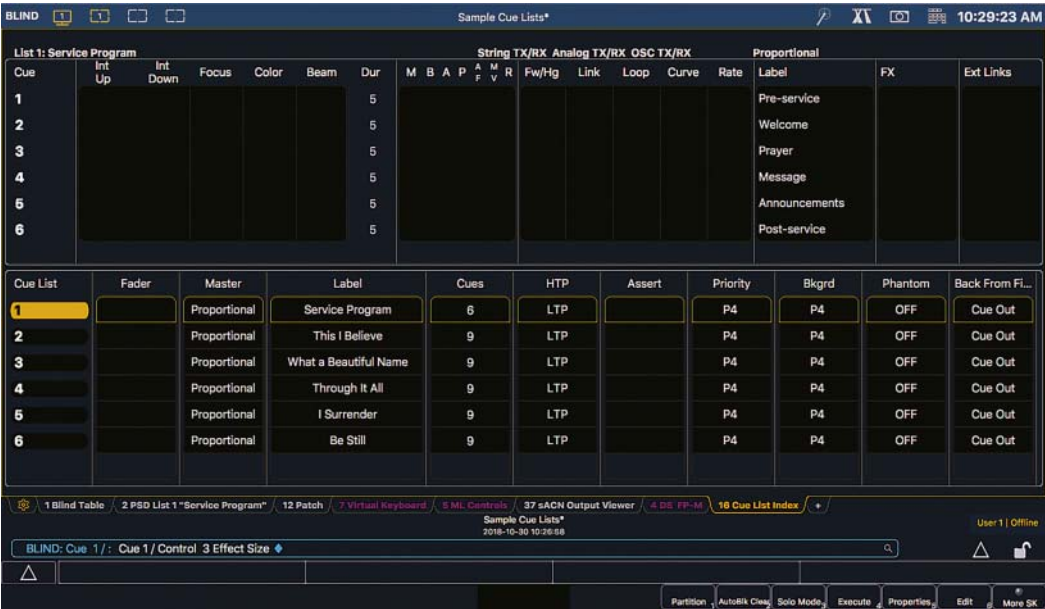
Step 1: understand the service

Before beginning to plan the actual lighting cues, and certainly before sitting at the console to begin programming, the first step is to know what elements will be included in the service you are programming for. Is there a band playing a worship set? What song will they be leading? Is there a drama sketch? What order will the various service elements be happening in? These questions will inform you on the service 'road map'.

In addition to understanding the road map of the service, discussions are needed about the general moods or tones that are to be set throughout the service – the 'emotional journey'. Is the general feeling and mood of the service going to be uplifting? Is the pastor's message one of celebration? Is the service mood going to be more introspective? These questions will give you a lot of information as to how you can create those transitions along the service road map so as to help you support and reinforce the desired mood or tone of the service.

All of these questions can be asked and should be answered during any pre-service planning meeting that may be had by those involved in the service. This planning meeting is what I would call a pre-production meeting, and will be the launchpad for the next steps as you script the service.

Step 2: cue structuring

The next step that I go through is to plan out the cue structure that I will program. This will be different from person to person, and also based on the lighting console that you have in your particular facility. The consoles that I work with allow me to program a number of cue lists, as opposed to a single cue list. I like to separate the lighting cues from more complicated

Cue lists on an ETC Ion console

Cue	Int Up	Int Down	Focus	Color	Beam	Dur	M	B	A	P	A/F	M/V	R	Fw/Hg	Link	Loop	Curve	Rate	Label	FX	Ext Links
1						5													Pre-service		
2						5													Welcome		
3						5													Prayer		
4						5													Message		
5						5													Announcements		
6						5													Post-service		

Cue List	Fader	Master	Label	Cues	HTP	Assert	Priority	Bkgrd	Phantom	Back From Fi...
1		Proportional	Service Program	6	LTP		P4	P4	OFF	Cue Out
2		Proportional	This I Believe	9	LTP		P4	P4	OFF	Cue Out
3		Proportional	What a Beautiful Name	9	LTP		P4	P4	OFF	Cue Out
4		Proportional	Through It All	9	LTP		P4	P4	OFF	Cue Out
5		Proportional	I Surrender	9	LTP		P4	P4	OFF	Cue Out
6		Proportional	Be Still	9	LTP		P4	P4	OFF	Cue Out

Redemption to the Nations church cues its Elation lighting rig to create a wide range of effects (Image courtesy of intyde)

or involved service elements to allow for better organisation as well as quick restructuring if needs be.

For example, I would create a main cue list for the major service elements, such as pre-service, offering, baptism, message, etc. I would then create a separate cue list for each song led by the worship band, as well as a separate cue list for a drama sketch or other special service element. The main cue list would then link to and reference these other cue lists, or I would operate them on separate cue list master faders.

Why would I structure cues this way? If the worship band leader decides to change the order 10 minutes prior to the start of the service, it doesn't mean I have to add link cues into a single cue list to bounce back and forth between cues in the new order. I simply pull up and play back the appropriate cue list in the new order that the songs are being done in. Another reason is that if a worship leader decides to do a song again at the end of a service, instead of having to find the cue number that a particular song began on, I can just play back that song's cue list because it can be easily found.

Another reason that I like to program this way is that these cue lists can then be saved and reused in other services when a particular song or performance is desired. For example, if your church holds three services on a weekend of different styles, and of the five-song worship set at each service there are two songs being performed at all three services, you only have to program the lighting cues for those two songs once. That same cue list can then be recalled and played back at each service at the appropriate point without having to copy and paste those cues into three different lists. This saves a lot of programming time.

Step 3: programming cues

Once you understand the service you are programming for and you have a clear, organised structure to program, then you can begin to build your cues. You may, or may not, already have all of the looks built that you want to use. There are many programming styles and methods that you can take prior to actually recording your lighting cues. However, for the purpose of this article, when programming cues, pay particular attention to the transitions

from cue to cue. It doesn't matter if the transition exists within a single song or between two very different service elements. Think about, test and design the fade times and the visual way that one cue transitions into another. It can be a very simple crossfade or a multi-part fade that transitions different programmable elements at different rates over an extended period of time.

Many churches will plan technical rehearsals prior to services to allow for the technical teams to test their equipment and ensure that everything is set up correctly and performing as desired or expected. Use these rehearsal times to play back the lighting cues and determine if the effect of the transitions supports the mood or tone desired for the service.

Once you have finalised the flow, make sure that the cue list can be consistently executed with whoever makes up your technical team. Unexpected circumstances will come up, and it is important that you have structured the cue list in such a way that also allows the operator to be flexible and make changes easily, perhaps with little training.

There is no one right way to script lighting cues for a worship service. The organisational differences from one person to the next are as varied as the different ways that lighting for a service can be approached. The steps that I have provided are just my own way of organising and scripting an event using lighting cues. However, the goal should always be the same: enhance the worship experience and support the message that is being delivered through the service. They are a great tool built into computerised lighting consoles, and the organisational possibilities for their use are endless.

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Using audio cues

Gordon Moore highlights the importance of using a written audio cue list for consistent, high-quality services

THE KEY TO CONSISTENT HIGH quality (in other words quality control) – in any endeavour – is documentation. If something works, write it down so you can refer to that successful method later. If something doesn't work, write it down so you don't repeat the failures of the past. Every successful continuing endeavour relies on repeating the successful and avoiding the disastrous.

Many houses of worship operate on what can be called the 'corporate memory' – the summed total of the experience of the staff who have developed methods over the years of working together in making the services run smoothly. The very big problem with corporate memory is that it lies in the cumulative experience of each member of the team. Should one of the team depart suddenly – without training a replacement – that corporate memory is now compromised, and essential elements of the process and procedures are lost – often for good. The team is doomed to repeat the lessons of the past and make the same mistakes made once before, a long time ago.

'This can't happen in my church. My team has been together for years – no one is leaving.' This statement is often the reason so many teams do not document what they are doing and why. Unfortunately, they forget one thing.

No one gets out alive.

As we all know, we all have limited time in this world and you can never know when a key member might be called home by our Maker. Or they might have a sudden event that pulls them away against their desires to stay.

This article will touch on a small but important function for consistent, high-quality services – a written audio cue list.

Audio cues are documented mixer settings based on the timeline of a service. Very much like lighting cues, audio cues give the sound mixer a script of audio settings based on what is happening in the service. It is often the case that a house of worship has a very detailed lighting cue sheet and nothing for the audio technicians. Why is this?

Lighting cues – if missed – are obvious to the congregation. If the pastor is speaking and the spotlight is still shining on the lead vocalist, the audience will see the bad result. It is inescapable. But missed audio cues can often be much subtler and not so easily noticed by an untrained ear. Yet those errors can detract from the worship experience. Let me repeat something I have stated many times in this column.

Audio must always enhance the worship experience. It must never detract from worship or, worse, replace worship.

People walking out from a service should never say, 'wow, that sound was great'. What they should be saying is, 'that service brought me closer to God – the music uplifted me'. It's a fine line to tread but, done properly, will help the church deliver the message and grow as a result.

So, how can audio detract? If there is supposed to be a hard-driving guitar solo in the third song that requires the compressor for the guitar to be ramped up and the level increased – that's an audio cue. If it is missed, the song loses its punch and the experience is diminished. If there is supposed to be a solo vocal in the fifth song with reverb engaged – and it is missed – then the solo doesn't stand out and carry the message.

Enter the audio cue list. The audio cue list can be handled at several levels.

The small church

If you are the only volunteer at your church who runs sound, the cue list can be pretty informal yet useful. Attend the band's practice and see what each song for the coming service requires. Make detailed notes. Sunday morning, arrive 20 minutes earlier than you usually do, take a bulletin and copy the notes to each section of the service. Carefully review the schedule of the service and write the following information for each stage:

1) Which channels should be active? Keep inactive channel faders down unless they happen to be a very quiet source, such as an instrument feed that is quiet (no hum like guitars can often deliver). In our church, the clavinova (piano) is always on because it doesn't contribute noise nor does it affect the gain before feedback. All unused microphones should be muted or faded down.

2) What level for that channel? Yes, the source might vary quite a bit but set a good starting point. If they sound a bit too low, you can always compensate by raising the fader. Try to avoid going too hot to avoid feedback and/or blasting the audience.

3) Any special processing notes? Change the compressor? Roll off the EQ for suppressed highs or lows?

4) Multimedia requirements – do you need to queue up the next playback in advance?

By writing all this down and attempting to anticipate what will be needed in each step of the service, you will have accomplished a preliminary 'rehearsal' in your head. Additionally, you will be able to plan ahead – preset faders, mutes, etc. – so you aren't scrambling to turn on the pastor's mic too late or turn off the guitar during the sermon.

Next, take a similar time after the service to analyse how the service went – did you forget something? Was one of your settings not good for that song or did you overlook a microphone that should have been on? Correct your notes by drawing a single line through your original setting and replacing it with the setting that actually worked. Don't erase your original note or scribble it out so you can't tell what it was. The single line will help you in the future to recall what does not work. Remember, the importance of documentation is not to just record what does work, but it is also to record what does not work. In that way, you can prevent making the same mistake, over and over again.

Finally, save your notes. Even if they are hand-scribbled notes on the bulletin, keep the notes. Now, I'm not a big fan of saving paper. It takes a lot of room and you have to keep organising it. For a small cost, you can buy a scanner and scan the bulletin into your sound booth computer (assuming you have one) and save it to a directory – which makes it very easy to search later. Save the scan as a searchable PDF document and you can even search for the settings you used on a particular song.

See Figure 1 on the next page. As you can see, there aren't a lot of notes but it makes it easier to anticipate the next step in the service and makes it flow more smoothly without late mics. It's not highly detailed but it will make your life easier.

Medium-to-large churches – with multiple sound technicians

In a larger church, you have the additional dimension of a larger technical crew with volunteers, paid staff or both. In this environment, the documentation becomes even more critical to achieve technical excellence and consistency.

Figure 1

First, develop a format for the documentation. In many churches, they use church planning software that can generate a spreadsheet or report which details each section of the service. Use the spreadsheet to create an augmented spreadsheet that allows you to detail each section in terms of channel settings, fader levels, gain, signal processing, etc. If you are using a digital board, list the scenes to recall if you are using them for each section of the service.

This document becomes critical when someone becomes sick or cannot attend a rehearsal. If each moment is documented, the

A spreadsheet that details each section of the service

substitute can easily follow the script, knowing in advance which microphone, which instrument and which source is required.

The document should include a corrections column (if the setting specified seemed too low, then the technician can make an adjustment and immediately document it). There should be a notes column that permits the operator to add comments that may prove useful for future changes.

This document can be provided as a live document on the computer screen that can be updated on the fly or as a printout that can be scanned later for safekeeping.

Do you have a member who is clever with coding? I have heard of some churches where the spreadsheet

executes macros that can send MIDI commands for coordinating scene changes and updates to the instrument and lighting settings.

For a multi-person crew, the most important part of this process, besides getting it written down in the first place, is to review the document each week and compare it with previous services. Look for trends – both for what worked well and what did not. As the team gets more accustomed to documenting things, you will find fewer and fewer additional notes as the process becomes more settled.

Take the next step

Once you get into the habit of writing up audio cues, expand the document to include the set up and tear down processes – the checklist before and after each service.

Getting into the habit of documenting your services is a difficult barrier to cross – people want to think their memories and capabilities are adequate.

Remind your team that documents prevent errors, make transitions easier and allow them flexibility in their schedules. And when they get that last-minute panicked call on Sunday morning, they will have a good document that will make their last-minute call to service enjoyable and less stressful.

Mix well and be blessed.

Rivers Church in South Africa

Working with video cues

Ensuring a seamless and engaging HOW service is harder than it looks but it doesn't have to be – this is where video cues come in. **Ledetta Asfa-Wossen** offers some guidance on how to elevate your service

ADDING VIDEO TO YOUR SERVICE is a great way to captivate your audience. In order to script your service with video cues, you need to create a plan. Having some structure to your proceedings is a godsend, it helps guide the event and lets you hold the attention of your worship congregation. And, the more structure a service has, the less room there is for error or any live interruptions. Should the need arise, you can also easily integrate a video element at short notice, in a timely fashion, without any disruptions.

Video cues allow you to play videos and still images with precise control over timing, sizing and placement on screen as well as any embedded audio. To set up video cues, you need a video or image file on your computer and a surface – this surface acts as a video output destination made up of one or more screens attached to a Mac or PC. Your output can be anything from a projector to an LED wall or monitor, depending on the size of venue, budget, the type of service and the level of impact you want to have. Once you've chosen the right software for you, all you have to do is go ahead and set up your video cue list. Remember, you can write up a video cue list but there
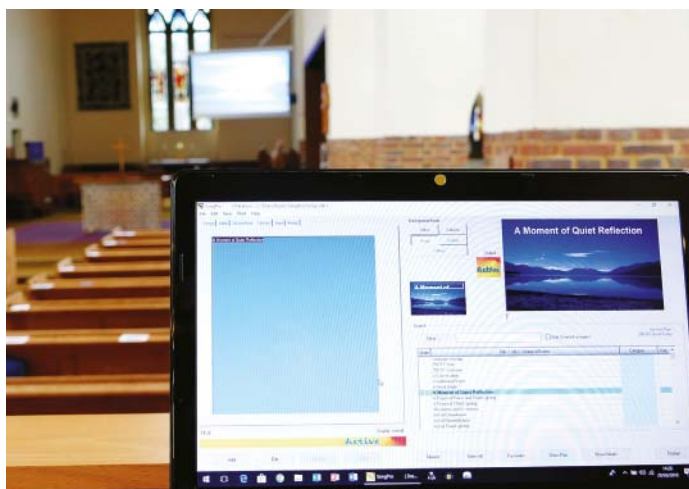
Creation Software's SongPro tool allows HOW venues to script video cues

are so many inexpensive software programmes readily available that allow you to create video cues and it requires minimal manpower.

'The aim of any worship presentation software is to really produce a simple, efficient plan of action to enable a smooth delivery of all service requirements with little effort and staff output,' explains John Barrow, software designer and founder of SongPro, an application used by HOW venues to integrate video, audio and lighting cues into their services. 'Your worship presentation software should be able to cope with any

changes to proceedings, provided you have a service plan in place,' he adds.

'The service plan is key and can be used to cue anything from songs, PowerPoint presentations, YouTube videos, liturgy, soundtracks, Bible passages and any type of moving or still image. Cues can make it easier for the audience to instantly follow any new references from the speaker – live, even changing to another translation can be a breeze,' says Barrow.

But where to start? Here are some top tips on setting up video cues and ensuring your worship service delivers the most impact.

The Atem 1 takes the feeds from the cameras and pushes these out to the screens around the church

Make a comprehensive service plan

The more you plan, the smoother the service. In order to get an idea of where your video cues should be inserted, you will have to first understand how all your other media elements will work such as lighting and audio. Think carefully about where to insert your video cues and the purpose they should serve. What type of service is it and what mood or emotion do you wish to evoke? Understand the key themes and the message of the service you are curating. Will the service be about empathy, birth or death? This will be crucial to forming your service plan and, ultimately, introducing in any cues.

You may want to use video to interrupt a long sermon, use live video streams to enhance the audience experience or use video projections as a moving background throughout the venue. How do you want your songwords to appear? Do you want to assign a video or image background to your text? Consider the positioning of any text you place on a video, so that any text is clear to read without overshadowing the visual display. It is also important to consider the seating positions and angle of your audience and their view of the screens.

Think about your display sequence and the order of your moving images and try and keep your timings and the quality of your video consistent throughout the presentation.

Do you want to involve your audience to create a more interactive experience? Remember that you can also use moving video images from a live camera feed as a background during liturgy in the service.

It's worth remembering that video cues can also play still images in all common formats such as PNG, GIP, BMP, JPG, PSD or PDF formats as well as play a video file in AVI, WMV or MPG.

Don't compromise on quality

You may wish to use some of your video files as full screen but ensure you check the preserve aspect ratio so that the video will play as large as possible without being distorted.

Entering a value on the axis will help you play around with the size of your video display. Simply enter values to enlarge or shrink.

Special effects go a long way

There are plenty of ways to manipulate, layer and customise your video – you can rotate them, fade one video file into another and create various stunning effects.

Rotation is an easy effect you can create with minimal effort. Fading video files and still images can also give you a polished, subtle transition. To create a fade, you need to play around with the geometry and set the level of opacity you want, which can range from 1–100%. Playing around with the timing of the fade will also alter the continuity, mood and impact of your service and can be tested before your video cues are finalised.

You can apply a wide range of effects to your video cues but remember that video effects can be extremely processor-intensive, and complicated effects have been known to bog down PCs and even the most powerful Macs.

Common mishaps and pitfalls to avoid

When creating video cues, broken cues can happen quite often, but these are usually easy to rectify and shouldn't put you off including video in a service. If there are errors with your cue files, check the source of your video file. It is quite likely that a file is missing, damaged or not a supported file type. In this case, you may need to revisit the surface, usually in a display or geometry tab on your software and create a new surface or adjust it to be compatible with the existing broken cue.

Practice makes perfect

Rehearse the service once you have formed your video cue list to ensure you are happy with the outline. The rehearsal stage is key for any last-minute video cue adjustments in order to guarantee a faultless, engaging service.
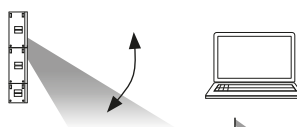
Computer maintenance pt 1 Cleaning the clutter

Frank Wells describes why cleanliness and order are important with computers used in a HOW tech infrastructure

COMPUTERS USED IN HOWs FOR video and sound playback, graphics generation and for elements of system control get more hands-on use, and often abuse, than other links in the infrastructure. Furthermore, without a planned and deliberate file structure in place, computer storage can quickly become cluttered and disorganised, inviting frustration while wasting time and effort.

This extreme example illustrates how a dirty environment can result in a gear-killing situation *Image courtesy of: CC-BY-SA-4.0 via https://commons.wikimedia.org*

Let's start on the outside. Keyboards are used flat, inviting dust intrusion at best, and food crumbs and potential liquid spills at worst. The best offence is a good defence. Keep food and drink away from computers and other gear. Put a clean cloth over keyboards when they are not in use. Ask operators to keep their hands clean.

Debris in a keyboard should be vacuumed out with a low-velocity vacuum. Cans of compressed air are commonly suggested for cleaning out between keys but should be avoided as they can drive dirt further inside the keyboard mechanics.

If keyboards show grime, a clean, damp (lightly damp and never dripping) rag can be used to clean keyboards, but never with the keyboard plugged in. Water might

do the trick, or a bit of household cleaner can be used, but never spray the keyboard, only the rag, and, again, only dampen any cleaning cloths. Take care that you don't use heavy-duty solvents that can discolour or mar plastics. With computer monitors and laptop displays, these same practices apply, including draping the monitors when not in use.

This filthy keyboard is a sign of a poor operating environment for gear

Computer CPU cases often end up on floors and under desks, inviting dust intrusion. Computer cases mostly rely on the power supply fan to exhaust hot air from inside the computer case. Some may have additional fans, inside and on the case. If any fans have filters, they should be kept clean. The outside of cases can be wiped down as above, but liquids should never be used inside. If you are qualified to open a computer's case, any debris or dust should be removed by gentle vacuuming. Pay attention to the small fans attached directly to the CPU, the main processing chip, and there are often fans on video processors, including directly on video cards. These fans are where dust builds up. A clean paintbrush can be used to dislodge debris while vacuuming. All cleaning should be done with the power off and the computer unplugged.

Maintaining a clean and uncluttered file system inside a computer is an operational concern, especially where a potentially large number of operators with various degrees of technical prowess will be using the computers. Logic and consistency are key, along with simplicity. It's like packing a bunch of items in boxes inside of boxes. A big box (the
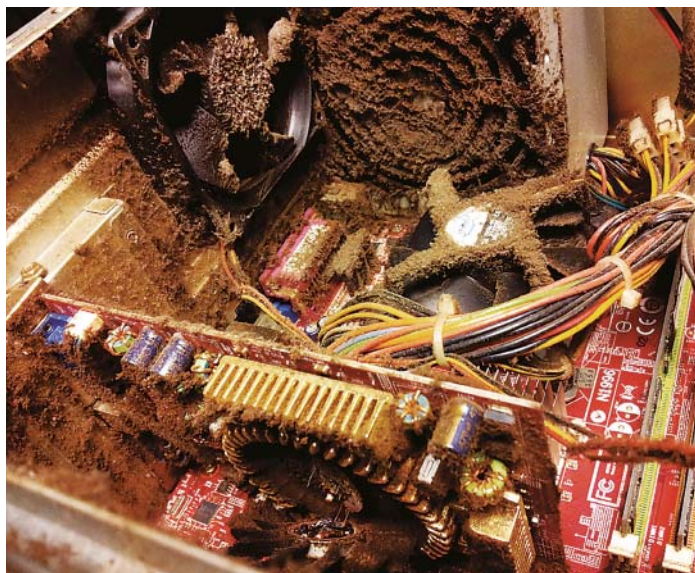
hard drive) has smaller boxes inside (folders). These smaller boxes can have additional boxes (more folders) inside of them, and any of the boxes can contain individual items (files).

Begin creating a folder and file structure by listing all the types of files used in your HOW tech operation. These could range from control files like lighting presets if using computer-based control systems, to videos, to worship song lyrics and scriptures. If you envision the file system as boxes, what would be logical to group together? There's a near infinite number of ways you can approach such organisation, and you have to figure out what works for your operation.

Perhaps you want all videos to play from a common folder, with subfolders arranged by type (music videos, youth group or children's ministry videos, promotional messages to run before services, etc.). Along with such organisation of assets, you may prefer to copy the elements to be used for a given service out of a potentially large library into a service-specific folder.

Naming folders and files is as crucial to an organised system as what's put where. Names need to be consistent and logical – make it as easy as possible for operators to guess a file location or a name to use in a search. Avoid names like John's Big Folder. Instead, use names that give information such as Praise_Music_Lyrics. Use underscores instead of spaces, even if using a space-friendly computer like a Mac. Never use special characters other than dashes or underscores. The drive might be read through a network by someone working on a Windows PC and the spaces could be converted to confusing characters. Develop a common system for dates. Day-month-year, like 03-05-2018, makes for orderly file system viewing and searches. Always use two digits for month and day.

Next issue, we'll consider data backup and file recovery in computer maintenance pt 2.

Why did the EU try to ban tungsten lighting?

And what would it have meant for houses of worship around the world? **James Cooke** finds out

THE BIGGEST LIGHTING STORY from 2018 saw the European Union (EU) propose lifting the exemption for professional stage lighting on its ban on tungsten light bulbs. The EU first introduced legislation in 2009 that banned the sale of tungsten lighting for domestic use due to its environmental impact, especially since LED lighting is readily available and much more energy efficient. While retailers were unable to sell the style of lamp for use in homes, venues using tungsten for entertainment purposes, including houses of worship, as well as theatres, arenas and school halls, were exempt from the ban and lighting designers petitioned with the manufacturers to continue making tungsten fixtures and bulbs for use in the professional sector. All was well for several years, until in 2018, when the EU proposed that the ban be extended into entertainment lighting.

While the EU's intentions were noble, those working in lighting design argue that not only would the ban have minimal impact on the environment, it would financially cripple venues not just in Europe, but around the world. For houses of worship in the EU without the budget to afford a whole new infrastructure, services would lose some – or all – of their visual excitement, and those around the rest of the world may have also found themselves in danger of not being able to replace the tungsten bulbs in their existing lighting rig, as it was questionable whether manufacturers would continue to produce tungsten products if such a large market employed a blanket ban.

Under such a ban, lighting rigs would lose the natural and warm light that tungsten delivers in venues that could afford to replace their systems with LED. Smaller venues, including school theatres and facilities such as houses of worship, could merely have been left in the dark, as the cost of an entirely new lighting system could be too much.

While several organisations led the charge to get the EU to reconsider, the Association of Lighting Designers (ALD) was at the forefront with its #SaveStageLighting campaign.

'Upon realising the scale of the problem, the ALD started working hard to draw attention to it across lighting designers, other lighting professionals, lighting manufacturers, other trade bodies, the wider public who enjoy lighting in shows, theatre producers and theatre owners, and MPs and MEPs,' explains Rob Halliday from the ALD. 'The campaign included projecting the phrase SaveStageLighting inside and outside a lot of venues, and it attracted a lot of attention in the media and beyond, including an online petition that over 82,000 people have signed so far.

'The EcoDesign regulations as originally proposed would have meant that tungsten light bulbs and a number of even very recent LED lighting fixtures would no longer have been allowed for sale, with manufacturers uncertain if they could make new LED sources that met the regulations. Since many venues still rely largely on tungsten lighting fixtures, this would have been catastrophic since it would have meant replacing the existing fixtures, and also having to replace much of the infrastructure behind those fixtures, particularly dimmers since LED fixtures don't need, and in fact can be damaged by, power from dimmers.'

The ALD wasn't alone in its fight and was joined by others from across the EU. 'Behind the scenes, the ALD started working with other concerned lighting organisations, including the trade associations PLASA (UK), VPLT (Germany), OETGH (Austria), the Society of London Theatre and others,' recalls Halliday. 'This work ultimately channelled through PEARLE, the European Producers League in Brussels. Between all of this, the entertainment lighting industry was invited to meet the EU's energy team in May 2018. This was a very productive meeting, and through that and follow-up discussions we persuaded the EU of the value of our case.

'As a result, the second draft of the regulations, published in July, contained a number of key exemptions for entertainment lighting, including the exemption of a wide range of specialist tungsten lamps, and for colour-mixing LED light sources. This means that the vast majority of equipment now in use for show lighting should be exempt.'

While this was positive, there is still some way to go in ensuring venues are able to make use of creative lighting. 'Though incredibly helpful, the July draft did leave a few potential issues for us and the equipment we use,' continues Halliday. 'The points were slightly technical: the requirement for lights to use 0.5W of power or less when in standby mode (when not emitting light), which is hard for show lights to achieve because they have to be able to react immediately when asked to light up – think of the big
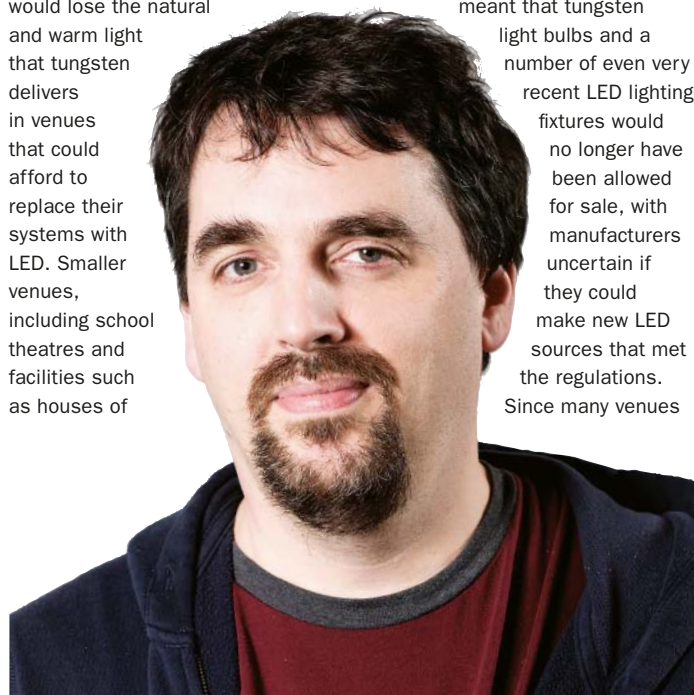
Rob Halliday of the ALD

"crash" cue with the music that would miss the moment if the lights took a second or two to react. The efficiency targets required which high output white LED sources – the kind used in fixtures for big theatres or on concert tours – would find it hard to meet, because they have bigger light sources and, as the

> *'I don't think we've avoided the "doomsday scenario", we've just postponed it'*

size of a light source increases, its efficiency decreases. The definition of green used in the exemption for colour-mixing LED lights would make it hard to design the most efficient colour-mixing lights. And a few specialist bulbs, tungsten and fluorescent, that had not been exempted but still had particular uses.

'The entertainment lighting industry has been trying to bring
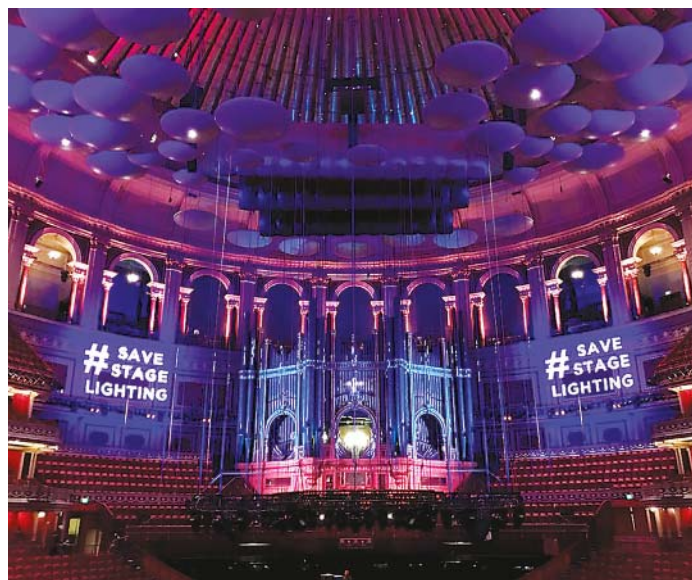
The Royal Albert Hall showing support for the #SaveStageLighting campaign *Image courtesy of the ALD*

these issues to the attention of the EU since July, but has had no success. The third, and we think probably final, draft of the regulations was published in early October and does not address these issues.

'The thing about these issues is that it would probably be possible for our cunning entertainment lighting manufacturers to work

around them, so they're not really disastrous. But it would be nice to have these details tidied up properly. We are still working to try to achieve this, and will continue to do so right up to the point where the regulations are passed into law.'

Unless the EU responds on these final issues, it would seem that the battle is over and that lighting

designers around Europe and the wider world can claim somewhat of a victory.

'Over the course of all this work, we've probably gone from a "doomsday scenario" for stage lighting to a scenario where people will largely be able to just keep doing what they do using the equipment they have,' Halliday concludes. 'That's good – but also dangerous. The danger is that people just assume they'll be able to keep doing that forever. However, the EU are constantly reviewing their rules and tend to update them in five-year cycles, and will start on the next review soon after these rules get passed. They've already made it clear that, in the next round, they really want to get rid of all these special cases and exemptions, and also finally get rid of the tungsten bulbs they consider inefficient. So, I don't think we've avoided the "doomsday scenario", we've just postponed it. Venues, including houses of worship, have to use those five years to start planning – and saving up – for what they need to do next, so we don't all just find ourselves in a big panic again five years down the line.'

www.savestage.lighting

Campus-wide audio networks

AoIP networking offers flexible and cost-effective interconnections within a HOW infrastructure. **Frank Wells** covers the considerations

AUDIO OVER IP (AOIP), THE distribution of digital audio over an internet protocol network, offers benefits that include lossless transmission from device to device and location to location, reduced cabling costs, multichannel audio over a single interconnection and bidirectionality – the ability to retrieve and insert signals from any location in the system. Building a complete facility-wide, or even campus-wide in the case of larger houses of worship, system leverages these benefits to offer audio system flexibility that is impractical in the analogue domain.

For instance, with a networked audio system, an audio mix from a main sanctuary can be tapped off the network for playback in a youth room or multi-purpose room for an overflow audience. Similarly, audio could be sourced from that youth room to share in the sanctuary. A worship service mix can be easily tapped for a nursery area, cry room or in hallways. A music playlist could be substituted for the worship service for ambient mood setting.

In an analogue system, such capabilities would require cabling – often heavy, expensive and bulky multi-pair cables – to be run to each location, typically from a central location where a hardware patchbay or an expensive router would be required to flexibly distribute signals. Such flexibility was rarely implemented even in large, well-funded HOWs.

A few words on wire

AoIP digital audio networks are fundamentally specialised applications of commonly available Ethernet technologies. Anyone who has connected a computer to a hardwired network is familiar with the cabling and connectors – a relatively small diameter cable that internally has four twisted pairs of wires terminated in an RJ45 connector. Such cabling is referred to by a category nomenclature that refers to specifications for the performance-determining internal construction of the cabling.
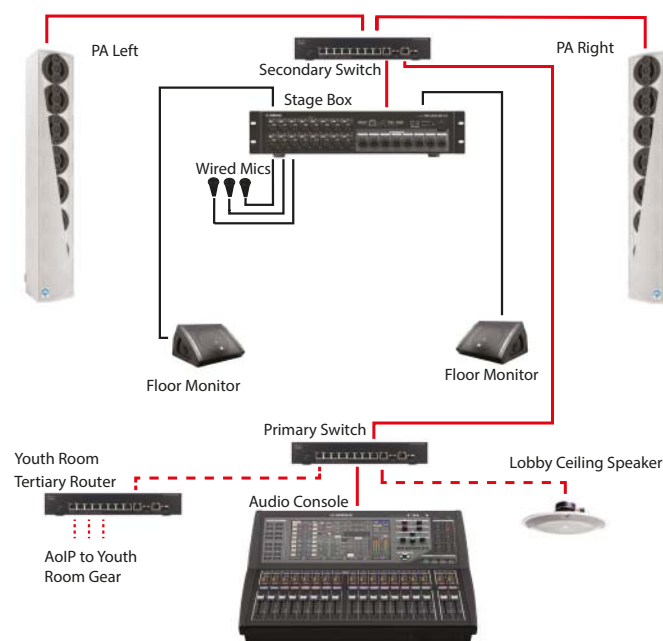
An AoIP interconnected audio system

For digital audio, Cat-5e would be the minimum acceptable cable type. To achieve gigabit data speeds over longer distances, Cat-6 provides an upgrade and Cat-6a and Cat-7 offer further improvements in performance. Regardless of the cable type chosen, the overall distance limit for a single cable run is 100m. Cat-6 cabling is not significantly more expensive than Cat-5e and is recommended for installed wiring (room-to-room) though, if budget allows, where video networking may also be desirable, where distances are beyond half the limit and for future-proofing the installation, Cat-6a or Cat-7 could be an option. The more flexible Cat-5e cabling can be used for short, local connections.

For distances longer than 100m, as in a large HOW or one with separate buildings, AoIP signals can be converted to optical fibre and run for maximum distances measured in kilometres instead of metres. Fibre is more expensive and requires specialist knowledge to terminate.

In general, a single run of cabling is all that is needed for a connection at any point in the network, though in a new installation or system-wide network, running a second cable for redundancy is recommended.

Traffic control

The components of an AoIP networked audio system are relatively straightforward. Bookending the system are transducers and acoustic/electrical signal conversion – microphones and guitar pickups on one end and amplifiers powering loudspeakers on the other. A network-capable audio interface reformats either analogue or already digitised audio into a network-compatible stream. Output as an Ethernet-compatible signal, the AoIP formatted signal is plugged into an Ethernet switch – in simple terms, a box with a bunch of RJ45 connections that allows multiple devices to be connected to a network. A downstream device that speaks the same AoIP language is also connected to the switch so it can retrieve the desired signals from the data stream and send them along to additional system devices.

The switch is the moderator of the system dialogue, interleaving packets of digital data (audio samples in the case of AoIP) with accompanying data and timing information that allows other devices on the network to retrieve individual or groups of channels from, and to insert additional channels into, the network stream.

Networked audio can be visualised as fleets of vehicles on an enormous traffic circle. Picture each source as having its audio samples deployed into identically coloured cargo vans. A main programme two-channel mix might all be assigned to a fleet of white vans, each vehicle in the fleet (the digital data packets in network speak) sequentially loading up as many audio samples as it can hold, posting a sign on its side saying what's inside and what its place was in line, and then starting off into the flow of the traffic circle.

The Waves Audio interface gives Yamaha consoles access to its proprietary SoundGrid networked audio system

Within the traffic circle, the vans may merge into traffic with a multitude of other differently coloured vans (packets of data from other audio streams), each with their own unique signs saying what they are carrying and identifying their position within their own fleet. Around the traffic circle, exits let fleets head towards a particular destination and incoming lanes allow new fleets to join the traffic in the circle. Wherever along the highway the two-mix needs to go, the white van fleet exits, reassembles in the proper order and their cargo is sequentially offloaded. The cargo vans are a bit magic in that they can

leave the circle at any and all exits simultaneously.

Each location being connected to an AoIP network should have its own home run of cabling between the location and the switch. At a given location, if multiple networked devices need to be attached, a local switch can be used for additional interconnectivity.

High-quality switches are important in AoIP applications. Switches must be able to support simultaneous gigabit data transfer and, to prevent audio connection interruptions, have the ability to turn off power-saving features. End-users should investigate the requirements specified for the networking protocol they plan to implement.

Wait, there's more than one protocol?

Professional audio (and video) are beneficiaries of the highly standardised IT industry as AV systems can adopt IT infrastructure such as Ethernet communication protocols, cabling and switches. But when it comes to using that infrastructure for audio, pro audio manufacturers have to choose between competing standards, or might even have developed their own proprietary protocol. This creates a language barrier to communication between devices. Examples of the options include Audinate's Dante – certainly the most ubiquitous AoIP protocol; the USA's earliest AoIP protocol, Livewire, by the Telos Alliance, found in widespread broadcast use; the Ravenna protocol from Lawo subsidiary, ALC NetworX, also with wide (if European-centric) adoption for broadcast and music production applications; and QSC's proprietary Q-Sys integrated audio, video and control platform.

It's up to the end-user to ensure that the networked hardware they want to use is compatible. Fortunately, there's a digital Rosetta Stone available that allows disparate audio networks to share audio data. The Audio Engineering Society created its AES67 AoIP interoperability standard for audio transport with the specific goal of shared access to audio signals across compliant networks. Although there are some qualifications, the audio networking protocols above were specifically mentioned here because they are examples of AES67-compliant networks that can share audio information. There are rapidly increasing numbers of hybrid systems in use where audio sharing across gear brands and AoIP protocols is facilitated by AES67 compliance.

AoIP-capable gear

In every category of professional audio gear, there are now network-capable options, including microphones with network outputs and powered loudspeakers with network inputs. Digital audio consoles now commonly have network ports either natively or via option cards. For devices without native networking capability, there are network-equipped interfaces that offer the necessary conversion for mic-level and line-

Need a mic in and a couple of channels of networked audio to feed a PA? Devices like the Focusrite RedNet X2P IO and monitor interface can be plugged into a Dante AoIP network at any point for input or Dante channel monitoring

Renkus-Heinz's IC8 RD digitally steerable line array has dual redundant Dante network inputs

level analogue input, for analogue output and for digital I/O. 'Soft' interfaces allow computer Ethernet ports to be used for digital audio network connections for digital audio workstation and other uses.

While audio networks for production applications are expected to remain independent for at least the immediate future, IP-based networking of audio and video mixed media is of immediate interest for HOWs that wish to move both video and audio within their facilities and campuses. There are a few non-proprietary protocols leading the competition for adoption. AVB (Audio Video Bridging, developed by the IEEE standards organisation) has been embraced by a number of audio manufacturers, but its adoption has been slow overall (at least in part because of the pace of development of the specialised switches required). Making a fast entry into the marketplace, particularly in broadcast, is the new SMPTE 2110 suite of standards for

professional media over IP. AES67 audio transport is written into SMPTE 2110, while a conversion device is necessary to merge AES67 audio into an AVB network.

For audio and video distribution, the NDI standard (developed by NewTek and made available with royalty-free licensing) is an audio/video IP network option adopted by a large number of manufacturers. NDI can function on existing gigabit networks and can be used on wireless networks for some applications. At least one developer of NDI-equipped tools has announced an AES67-NDI interface.

Audinate has also entered the competition, announcing a partnership with the SDVoE (Software Defined Video over Ethernet) Alliance for an integrated AV control platform (see 'The future of audio networking' in *WAVL*, Nov/Dec 2018).

Where to start

Begin conceptualising a HOW AoIP system by asking questions. What protocols are supported by your digital audio console of choice? How about by your processing and amplification chain? Can your loudspeaker system accommodate networked audio inputs? Where do you need audio signals now and where do you source them from? Where might you need networked audio connections in the future?

Make a needs list and a wish list. The wiring is cheap – while you are making runs elsewhere within your facility, run Ethernet cabling to locations you may wish to use in the future, even if you leave those leads unterminated in the short term.

It's not often that the simpler choice yields more sophisticated results with reduced expense. IP-based system interconnection offers such a choice.

PTZ cameras in HOWs

Are PTZ cameras the right choice for your house of worship? We take a look at some of the key factors to consider

Rear-wall fixed Epson EB-Z10000U WUXGA projectors and Datavideo PTC-150 HD PTZ cameras

A HOUSE OF WORSHIP PLANNING on recording or playing back moving imagery in one form or another has several levels of equipment choices at its disposal; options that differ greatly with capability, but often more importantly with price.

Cameras come in all shapes and sizes, but there are only a few that will be relevant for the worship setting. Unless your HOW is working on big-budget Hollywood productions, it is unlikely you will need to consider high-end film cameras designed for cinema. Likewise, unless you plan to be out in the field and require a quick portable set up, then DSLRs, GoPros and gimbal-based handheld devices are probably not what you're after either.

A lot of the more elaborate video production setups are never going to be found at smaller worship venues, as most of the gear would be overkill. Yet any house of worship employing video is likely to have at least one or a few PTZ cameras in its arsenal. Traditionally, they have been a great entry point – able to produce decent-quality video but often at a fraction of the price of proper professional cameras.

What makes a PTZ camera a PTZ, and why might one appeal to your congregation?

PTZ stands for 'pan-tilt-zoom'. That is, a PTZ camera is typically capable of performing remote-controlled directional and zoom control. However, this is a very broad definition and has led to the use of several techniques to achieve the same purpose. There are many types of cameras that can be panned, tilted and zoomed, and there are also add-ons that can make any normal camera pan- and tilt-able. As far as the industry is concerned, PTZ cameras are of the type found in Figure 1: a fixed position, all-in-one unit.

'PTZs are the most flexible at every camera position, and the performance of single-chip cameras has taken huge strides to close the gap between affordable and high-end cameras,' explains Marshall Electronics' director of Pro-Series cameras, Tod Musgrave.

At the introductory end, the PTZ part of the equation lies in the camera itself, i.e. the camera has control capabilities built in and just needs an operator or controller interface to function. At the top end of the scale, PTZ-type solutions are still widely used by ministries using full-blown television broadcast production; however, these setups are far more likely to enlist traditional broadcast video cameras that have been

Figure 1 – a Datavideo PTZ camera

adapted to accept remote input – not what our industry typically considers to be a 'PTZ camera'. These types of systems are commonly referred to as robos, an abbreviation of robotic camera.

'Many HOWs use robotic-controlled cameras, generally of a simple type with limited "on-air" movement,' says Shotoku sales director, James Eddershaw. 'A pan and tilt head is required for each camera, along with a suitable lens control interface and an operator control panel.' The benefits of this approach are achieving optimum recording quality, maximising flexibility of movement and allowing cameras to be used for multiple purposes. Unless you already own the cameras, however, the financial considerations cannot be overlooked.

This has often been the way to get full pan/tilt functionality while retaining the image quality and all other professional features of standalone cameras, but the price implications were severe and completely unnecessary for all except the largest ministries. Yet, as technology continues to improve, even these dedicated systems are beginning to find themselves replaced with the cheaper and nimbler integrated type.

By far the biggest change for PTZ cameras in recent years has been the increase in picture quality. Resolution, as one of the most important attributes governing image quality, is typically the major

A camera controller using joystick PTZ controls

consideration for buyers. Be wary, however, that manufacturers have a habit of misleading customers when it comes to resolution. Bigger is only better up to a certain point and, after that, attributes such as the sensor size and sensor type (CCD or CMOS) begin to take priority. Specifications such as the sensor size also indicate how the camera might behave in sub-optimal environments, such as low lighting.

'First and foremost, choose a camera that provides the best video-quality performance within the budget expectations. Essentially, make sure to maximise your ROI to make your money go as far as possible,' notes Musgrave. 'Second, make sure to choose an adequate focal range or optical zoom range that will do the job determined by the size of the space and the distance the camera is installed from the shot. Can you zoom all the way in to achieve your goals?. Third, I would strongly advise you to demo cameras anywhere and everywhere possible for evaluation prior to purchase.'

While a lack of budget is a common complaint in houses of worship, Musgrave sees this as a positive in this instance, explaining that one of the biggest purchasing mistakes he sees churches making is the assumption that price drives quality, without even evaluating lower-priced alternatives. 'At this point, there are PTZ cameras for every budget and, while you want to get the best ROI, don't let price drive the entire decision,' he furthers. 'Evaluate camera alternatives at every price point; the lower the price, the more camera positions you can install. Just make sure to install cameras that will bring you the best video-quality expectations.'

A Panasonic PTZ motorised zoom lens used for live video capture

Nowadays, a HOW should ideally be looking for full 1080p HD resolution or higher, even if other existing equipment isn't up to standard. There are plenty of affordable HD PTZ cameras available and, thanks to the proliferation of ever-higher resolutions in consumer technologies, it won't be long before your congregation demands it.

It's easy to presume image quality is the be-all and end-all of video camera concerns. It is massively important but it's also extremely easy to evaluate. Features that are often overlooked can

PTZ funcationaility can still be added to normal cameras but those are normally known as robos

cause some big headaches down the line. For example, how smooth is the panning mechanism? Many PTZ cameras are designed for the security market as they are low-cost, can be remote-controlled and remotely viewed – some attributes that make them appealing for HOWs. If the mechanism isn't smooth, camera movement could send the resulting image jumping across the screen. How loud is the operating noise? Traditional congregations are likely quiet environments and any camera noise must not be audible over the background noise.

A TVLogic TVR-200H controller

As you can see, there's more than meets the eye when it comes to PTZ cameras, but the features themselves are reasonably self-explanatory. A thorough understanding of what needs to be achieved will lead to the right solution. Research is key but evaluation is paramount. Ask friendly congregations what solutions they use, or alternatively look at renting various units so you can 'try before you buy'.

While it's not the case anymore that traditional production cameras vastly outpace PTZs in terms of image quality, PTZs do tend to be more expensive than similar-quality studio cameras. After all, a PTZ is a combination of camera, motors and electronics. Add in a high-quality

control interface and the numbers increase. There are entry-level models, but movements from entry-level PTZs can seem robotic and jerky. For a camera that produces smooth movement, that's designed for live video production, don't necessarily expect to be saving vast sums of money by opting for PTZ over production cameras.

Of course, there are other benefits. For many churches, PTZs will be the logical choice due to space constraints and, likewise, if you struggle with volunteers and people to man cameras. One person can run multiple PTZs, and multiple camera angles and positions provide more compelling viewing.

'Be sure to leave enough in your budget to be able to add at least a few more camera points of view,' suggests Musgrave. 'Static position shots can get boring, so make sure to vary PTZ camera positions and add several low-priced cameras to get additional POV shots.'

Having a single camera operator run two or more tripod-mounted cameras is difficult, if not impossible. Switching between control of multiple PTZs is often a flick of a switch or a press of a button. Furthermore, getting a reaction shot can be easier with a PTZ, too. If someone turns around and points a big camera at someone, the motion will often distract from the service. If, however, a small PTZ camera silently turns around during a prayer, people in the congregation may not notice at all.

The most important thing to remember is that the market is always changing. If you explored PTZ cameras several years ago and discounted them for one reason or another, now might be the right time to reassess.

The Sony PTZ camera at the Drive Methodist Church can barely be seen by the congregation

480MHz   490MHz   500MHz   510MHz   520MHz   530MHz   540MHz   550MHz

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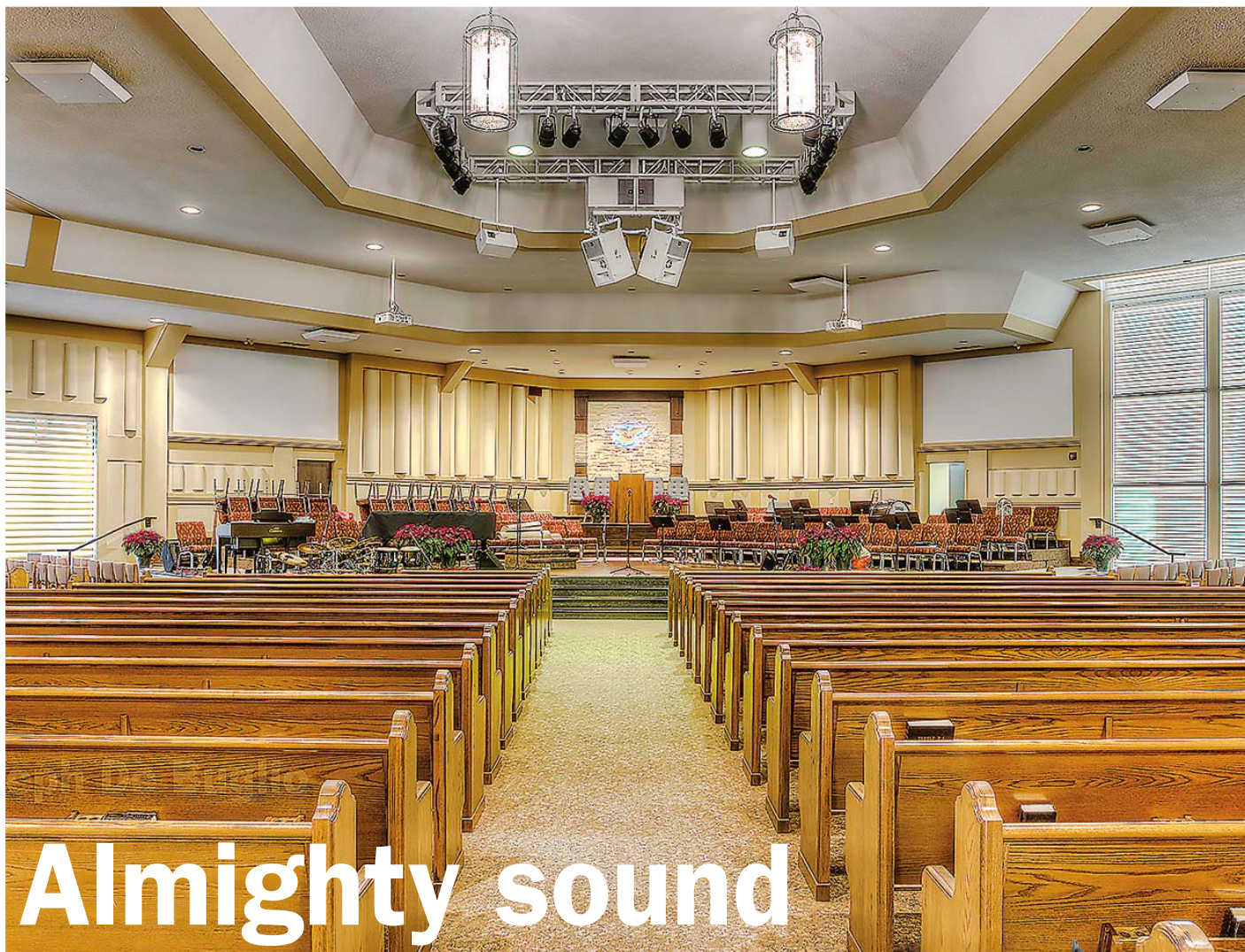
Almighty sound

How do you decide on the best PA system for your house of worship? Is line array better than point source? **Ledetta Asfa-Wossen** separates the wheat from the chaff

THE DEBATE OVER THE USE OF line array versus point source is an age-old discussion among pro audio pedants but, while the question seems straightforward, the answer is far from it.

A good starting point is to carry out an initial assessment of your HOW. Calculate the size and shape of the seating area that requires sound coverage and take the time to assess the degree of focus on music required for your venue and its architectural design. Note any areas where sound needs to be ushered away from acoustically reflective areas. The overall aesthetics and sightlines also need to be considered well before the buying process.

'Before a systems designer comes out all guns blazing, it is essential to understand the operational requirements of your HOW. Second, evaluate your room – especially the height-versus-depth ratio. Third,

never fight with the room,' warns Yusof Ahmad, pro territory manager at Bose's Professional Systems Division (ASEAN and Korea). The first step ensures that expectations are being managed at the outset and the second is vital in deciding whether to go for a line array or point source.

Then, ask why your HOW would use a line array in the first place. Surely, you could just stack up a bunch of point source speakers and just get on with the show? After all, that was how it used to be done. In the early days of large PA systems, vast numbers of horn-loaded point source speakers were simply mounted on scaffold structures and directed towards the audience. Unfortunately, it is not as simple as that.

One advantage of a line array, according to Ahmad, is that you're able to rig more loudspeakers in an array hang while still achieving an overall coherent response. 'A line array system design tool brings forth

the ability to predict, direct and manage sound energy to fit into a given room geometry,' he adds. When correctly installed, a line array allows even frequency response and clear sonic coverage throughout the range of the system.

It is also worth noting that while line arrays produce high output through the combination of a number of elements, new, highly efficient and powerful point source systems can now compete with line arrays at all levels. While in certain cases line arrays may be more scalable than point source, it is ultimately about selecting the right size system for your venue.

But there is no hard or fast rule when deciding on whether to opt for a line array or a point source audio system – 'there is a reason why this is one of the oldest debates going among pro audio purists,' he adds.

Six units of the Bose ShowMatch full-range array modules suitable for HOW venues

'Over the years, I've received my fair share of such enquiries. Height-versus-depth ratio gives a relatively good guideline. I've seen venues with a depth of around 40m from the stage lip to the last listening row, but with a height of about 3m. And yes, they've asked for line array speakers. This is an example of a situation where line arrays are inappropriate. Although to cover that depth a line array would perform splendidly, there is a height constraint. Usually, for these kinds of spaces, a well-

problems in the horizontal plane but did not overcome the destructive interference occurring vertically and the high-frequency cancellation from air disturbances caused by wind and audience heat. Line arrays can also suffer from poor impulse response due to varying time arrivals of the sound to the listener, reducing clarity and image,' explains marketing director, Jan Jareš, of Czech audio manufacturer, KV2 Audio.

Unlike traditional point source speakers, you can add more volume to a line array by adding to the

The Amate Audio X212AF is another example of a line array being used by HOW venues

Arrays of point source systems grace the inside of the Rock Cathedral in Lagos, Nigeria

designed point source distributed system with delay tiers carefully time-aligned, will outperform a line source. The above also concludes that you should never fight with the room because you'll never win. You have to negotiate with the room. This is where professional services are called upon. Depending on the scale of the project, acousticians, consultants, manufacturers or even an industry expert should be consulted to give you advice for your particular venue,' notes Ahmad.

A true point source loudspeaker system is a single enclosure or combination of enclosures placed physically together, which presents sound from one point as opposed to multiple points.

'The development of the line array came about in an effort to produce high SPL coverage over large distances with a degree of pattern control in respect to the dispersion of the system. Line arrays were an improvement over the composite, box-type concert systems of the 1980s that consisted of multiple point source boxes being stacked together. Having all components in a single axis array solved certain issues in respect to the comb-filtering

line, but this increased range can come at a price. 'The key benefits of a true point source audio system are superior balanced integrated sound, smooth, even dispersion and high definition through a lack of destructive interference. They're also very easy to transport, set up and operate and do not require software programs to calculate alignment. They cost less to install too. A point source system, by its very nature, is ultimately limited in its scalability,' adds Jareš.

In terms of technology, the effort to further advance line array systems is ongoing. According to Ahmad, some manufacturers have now introduced electronic beam-steering capabilities in their line arrays. Other companies have devised clever ways of designing the speaker cabinets and its accessories, making transportation and rigging far more convenient. Meanwhile, others are continuing to sharpen their design software capabilities.

'While many manufacturers and engineers will argue the benefits of pattern control with line arrays, the problems of destructive interference and poor impulse response make them a poor choice in respect to sound quality and clarity when

compared to point source systems. Just like line arrays, though, proper system placement is imperative for the correct operation of point source systems. Unlike line arrays, true point source systems use the off-axis attenuation of the box to create even SPL and coverage in the venue,' states Jareš.

Additionally, point source systems use less units compared to multi-array elements.

There is no clear-cut answer when it comes to point source versus line array. What is evident, though, is that the choice of PA system is greatly influenced by a number of factors, including the structural design of the venue, research, budget and programme material.

'To someone who's new to line array, you're going to have a lot of fun. It's also essential to understand line source array fundamentals. If that's not possible, at least know the basics. The knowledge will go a long way and be sure to discuss your options with an experienced industry practitioner,' advises Ahmad. Regardless of your level of audio knowledge, or any advice given by an audio professional, the selection of any audio system should be made after thorough testing and comparison in the space or a venue with similar acoustics. Only then can you ascertain which system best suits your HOW needs.

The KV2 Audio point source setup at the Romanian Pentecostal Church of God in Kitchener, Canada, featuring ES1.0 speakers, ES1.5 subwoofers, EPAK2500R amplifiers, ESD10 speakers, ESD6 speakers and an ESP2000 amplifier

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NEW PRODUCTS

The 6060 lavalier in black

...niature mic

...been asked to ...eate a subminiature microphone by the theatre, film and television industries, DPA Microphones is adding to its d:screet and d:fine ranges with its 'smallest-ever' microphone capsule. The d:screet Core 6060 and 6061 Subminiature Microphones and the d:fine Core 6066 Subminiature Headset Microphone are 3mm in diameter – 2mm smaller than DPA's existing 4000 series of miniature microphone products. All three microphones incorporate the company's Core by DPA microphone technology that reduces distortion and increases dynamic range.

'Giving the market the most advanced technology and the best sound possible has always been DPA's goal and we delivered this in our smallest capsule to date with this new mic,' stated Kalle Hvidt Nielsen, DPA CEO. 'The 6000 series represents a significant step forward and is without a doubt the best miniature microphones DPA has ever made.'

The capsules are omnidirectional and have a frequency range of

The 6066 subminiature headset in beige

20Hz to 20kHz. The d:screet 6060 lavalier has a noise floor of only 24dB(A), while the d:screet 6061 lavalier and d:fine 6066 headset have noise floors of only 26dB(A). All three capsules are available in black and beige and the company reports that more colours will be added at a later date.

But shrinking such small microphones down by another 2mm is no cavalier task. 'We are already moving on the edge of what is physically possible,' Ole

Moesmann, DPA's R&D manager, told *Worship AVL*.

'Going through all the parts of the microphone, optimising and adjusting, has been another R&D task at DPA that has pushed the limits of what is physically possible. Achieving a noise floor on par with our 5mm designs for the 6066 headset and the 6061 lavalier was not an easy task. We have a diaphragm area on the new 3mm capsule that is less than 30% of the 5mm, so in theory

the noise floor of the new design should be much higher.'

The d:fine 6066 is described as a one-size-fits-all headset that attaches over the ears and has a spring mechanism to help it grip below the ears and to the side of the head for added security. The cable attachment has been redesigned so that the cable runs down the wearer's back and cannot be seen.

Meanwhile, DPA has also unveiled its pocket-sized MMA-A Digital Audio Interface, a 2-channel preamp and A/D converter that reportedly works with any iOS device, Mac or PC computer, and has been designed for users to broadcast or record sound anywhere in the world. The MMA-A comes with interchangeable lightning and USB cables for connectivity and MicroDot inputs that allow it to be connected to all DPA capsules.

www.dpamicrophones.com

Comfortable listening

THE 300 Pro series from Sennheiser has been designed with comfort in mind, including new padding material, a comfort zone for the temples of glasses and split headband padding that removes any pressure from the sensitive area of the fontanelle. Detachable cables are said to offer improved protection against handling noise thanks to a small series of coils that acoustically decouple the cable from the headset.

The range includes the HD 300 Pro; HD 300 Protect with selectable ActiveGard technology, said to protect the wearer's ears from sudden sound bursts without interrupting the audio signal; HMD 300 Pro, a closed, circumaural communications headset with selectable ActiveGard; HMD 300-

XQ-2 with a detachable cable featuring XLR-3 and ¼-inch jack connectors; and HMD 301 Pro, a single-sided headset with side support.

Sennheiser has also launched a new professional IEM series, beginning with the IE 40 Pro entry model. At the heart of the IE 40 Pro

HMD 300 Pro

is a Sennheiser driver that offers low-level distortion of 0.1% at 1kHz and 94dB. Neodymium magnets provide the necessary punch to take SPLs up to 115dB. To protect users against excessive stage sound, the IE 40 Pro is able to reduce ambient sound by up to 26dB. This is achieved by a choice of silicone ear tips and a special ear tip made from memory foam, which expands to fit the ear canal. The design also includes patent-pending cable ducting that is said to reduce the risk of cable breaks. The connector is situated inside the

ear mould to protect from wear and tear. The IE 40 Pro will be available in black and transparent versions, complete with a soft storage pouch, a cleaning tool, silicone ear tips in three sizes (S, M, L) and a pair of

IE 40 Pro

memory foam ear tips in size M. The IE 40 Pro will be joined by the IE 400 Pro and the top-of-the-range IE 500 Pro in the near future.

www.sennheiser.com

Countryman dons a new headset

COUNTRYMAN'S NEW H7 headset microphone is designed to shut out surrounding noise with a wide dynamic range and a precision cardioid pattern. It is also designed to be rugged, yet comfortable to wear and is intended for presentation applications, such as HOW services, among other uses.

The manufacturer states that the mic's extended dynamic range and

precision cardioid pattern provides consistent coverage across the audio frequency range, ensuring an uncoloured on- and off-axis response and a noticeable reduction in feedback and surrounding noise. The H7's 'ultra slim' side-address capsule maintains a low profile while removing sweat and moisture. The unit weighs in at under 7g and its frame adjusts to fit all manner of head size. The

mic boom slides independently of the ear loops, ensuring the correct placement for the user's mouth, and can be flipped to run down the left or right of the face.

www.countryman.com
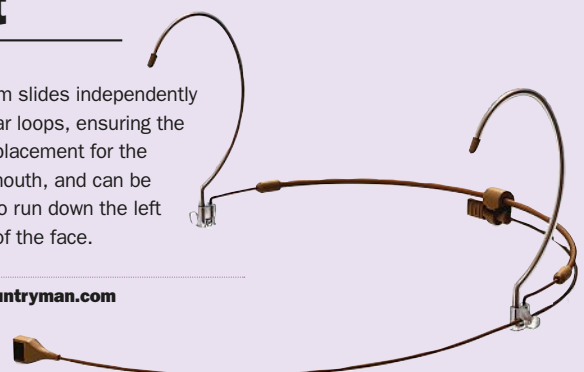
H7 headset mic

Crest Audio powers commercial installs

Crest Audio's C1 86k DSP power amp

CREST AUDIO has designed a new range of installation Class-D amplifiers integrating DSP, Dante protocol networking and USB/Ethernet connectivity for monitoring and control. The C1 Series is equipped with Euro connector inputs and barrier strip outputs in addition to fault relays and CV (control voltage) inputs.

All four models incorporate a switch mode power supply with full bandwidth PWM modulators for low distortion, high efficiency and superior circuit

protection. Protections include a clip/limiter function for output monitoring preventing speaker damage and gentle gain reduction at clip threshold together with efficient heat dissipation and overheat protection. The C1 86k is an 8-channel amplifier offering 750W/channel into 4Ω, while the C1 48k is a 4-channel model providing 2,000W/channel into 4Ω. The C1 44k and C1 25k are 4-channel 1,000Wx4 and 2-channel 2,500Wx2 versions, respectively.

The internal DSP engine comes with sampling rates of 96kHz/24-bit and 24-bit AD/DA converters, and provides access to IIR HP/LP crossover filters, RMS compressor, parametric EQ, alignment delays, white/pink noise and other parameters. Input sources can be selected and presets loaded via the front panel LCD touchscreen. Alternatively, a Dante network module enables primary and redundant connectivity to a digital audio network with external monitoring and control of the amplifier. Loaded with Peavey's MediaMatrix hardware and NWare software, the C1 Series power amps can also be integrated with other DSP/control platforms that support Dante audio networking.

Meanwhile, the PB-32 SoundGrid-to-Dante network bridge has been

launched to provide the connection between Crest Audio's flagship Tactus digital mixing system and its powered Versarray Pro line array system. The PB-32 will enable the audio signal to remain in the digital domain from the desk to the Dante-enabled Versarray Pro PA system. Housed in a 1U ½-rack chassis, the PB-32 provides up to 16 channels of bidirectional audio to be transmitted and received by each network (SoundGrid and Dante) via interchangeable 16x16 networking modules. The unit is shipped with one Dante and one SoundGrid module as standard but may be loaded with two Dante cards to link separate Dante systems with different clock sources.

www.peaveycommercialaudio.com

QSC reaches a milestone

DESCRIBED AS a 'major milestone' for the company, QSC has introduced its CP Series of compact powered loudspeakers. The ultra-compact form factor and light weight are said to provide effortless transport and deployment in both portable and installed applications. The CP Series is comprised of two 2-way models: the CP8 and CP12.

streaming and distribution. The switches are said to provide an out-of-the-box, plug-and-play solution for Q-Sys integrators building local AV networks. They also provide a number of PoE+ capable ports for convenient connection of networked AV peripherals.

www.qsc.com

The CP8 and CP12

Both models feature a 1,000W Class-D power module, one-touch preset DSP contours and line, mic/line and 3.5mm stereo inputs. Each speaker can be pole-mounted, used as a floor monitor or deployed in a fixed or temporary installation.

The US manufacturer has also launched its NS Series network switches that have been pre-configured to meet the performance requirements of the Q-Sys platform, as well as network AV technologies including AES67, Dante and Q-LAN video

A pole-mounted CP12

R-H meets its match

RENKUS-HEINZ HAS added matching ICL-XS and ICL-118S subwoofers to its IC-Live X Series, with the ICL-XS becoming the first dedicated column subwoofer in the family.

Featuring four 8-inch woofers, the ICL-XS is intended for integration beneath ICL-X and ICL-XL arrays, resulting in one discreet array that reportedly offers full-range performance, consistent coverage and minimal aesthetic intrusion. The ICL-118S, meanwhile, is a high-output subwoofer designed for large-scale events or venues with high LF SPL requirements. It offers a single, high-excursion, 18-inch woofer in an optimised bass-reflex cabinet, powered by a Renkus-Heinz SA-2000 amplifier for nearly endless power.

In addition to the two matching subwoofers, the manufacturer has introduced the DC Series Directivity Control vertical column speakers. The first product to join the series is the DC12/2 self-powered column speaker, which houses 12 2-inch, full-range drivers, 12 DSP channels and selectable presets that adjust the directivity and coverage patterns. For ease of set up, the presets can be selected using a smartphone. The DC12/2 is intended to be used in standalone applications, including as main speakers in small venues such as boardrooms and small gymnasiums, as fill speakers for transepts or balconies, or as overflow room-fill speakers.

Finally, the manufacturer has introduced what it describes as 'a full-blown Iconyx speaker in a smaller, high-value package'. The

IC12/3

IC12/3 incorporates all the features typical to the Iconyx line, including Rhaon control, beamware integration, Dante or AES input options, RJ45 or fibre optic network connections. The speakers house 12 3-inch, full-range drivers with broad horizontal coverage and 12 amplifier/DSP channels to deliver high granularity for steering.

www.renkus-heinz.com

Clearly Cloud

CLOUD ELECTRONICS has introduced a new range of energy-efficient amplifiers with the CV-Series digital multichannel 70V/100V amplifiers. All models in the CV-Digital series offer a total power output capability of 1kW shared across the amplifier channels. This flexible approach allows a single, multichannel amplifier to drive loudspeaker systems differing in load size, in different areas of a building or venue, while optimising overall power output capability.

Designed to be Energy Star compliant, the CV-Digital Series models come with Automatic Power Down. This trigger mechanism is activated should an input signal not be detected within 30 minutes, reducing power consumption to just 2.5W for which remote control of the power down state is available via an external contact closure.

A full suite of user configurable DSP functionality is on board including input routing, multiband parametric room and speaker optimisation EQ, output level

CV2500

control and limiting, together with 1.5s of assignable delay. Amplifiers can be easily set up for multichannel or parallel channel operation and biamping with full control of crossover parameters. Providing the same DSP power as the normal amplifier channels, the auxiliary outputs can be configured as traditional slave outputs, or used as independent signal processing and routing channels.

Compatible with standard Cloud RL Series remote level control plates, DSP parameters are accessible via RS-232 and Ethernet for interfacing to third-party control systems including Crestron, AMX and Control4. A 3-way GPIO port can be configured for external master mute and fault condition signalisation.

www.cloud.co.uk

Compression-free performance

WITH THE aim of offering audio solutions for all room sizes and applications, Genelec has announced the release of two high-SPL SAM monitors: the 2-way S360 and the 7382 subwoofer. Suited for large control room setups, the speakers are housed in a compact, low-diffraction enclosure.

The S360 features a 10-inch, high-efficiency and minimal distortion woofer based on the company's Master Series and an integrated extended directivity control waveguide DCW supporting the 1.7-inch titanium diaphragm compression tweeter. It has a short-term SPL capability of 118dB and a long-throw capability that can reportedly provide reference-quality accuracy at distances of over 10m. Other

Genelec's S360

features include an uncoloured 95° (H) to 75° (V) dispersion and in-wall and on-wall mounting options.

The 7382 is described as the company's most powerful subwoofer to date. It delivers low-frequency extension down to 15Hz and houses three 15-inch, long-throw woofers. Each woofer is said to benefit from the vibration-free environment of a heavily braced fibreboard enclosure, with laminar flow bass-reflex porting extending along the rear wall for a 'low-distortion and compression-free performance'. The 7382 works with GLM software to control bass management or solve issues of subwoofer placement in unpredictable rooms.

www.genelec.com

RDNet processing from RCF

RCF HAS added three loudspeaker models together with complementary flyable subwoofers to its HDL series of composite line array enclosures. Sharing the same design footprint as other HDL cabinets, the new models differentiate themselves with the incorporation of RDNet processing. Furthering on from the development of the HDL 6-A, the HDL 26-A comprises dual 6-inch woofers with a 3-inch compression driver and a 1,000W RMS Class-D amplifier for use with the HDL 35-AS subwoofer.

Comprising dual 8-inch woofers with 2.5-inch voice coils and a 550W RMS amplifier, the HDL 28-A has been designed to be partnered with the HDL 36-AS 15-inch subwoofer. Finally, the HDL

HDL 38-AS

30-A can now be paired with the HDL 38-AS subwoofer. Equipped with a 1,600W RMS Class-D amplifier, the single 18-inch model is capable of extending the LF range to 30Hz and integrates RDNet loudspeaker management control. The adoption of RDNet 3.2 recognises and connects all the cabinets in a network upon powering them on. While the Bass Shaper function allows adjustments to the low frequencies, the Air Compensation function corrects the system response in real-time.

HDL 26-A

www.rcf.it

Dynacord's TGX20 amp

Dynacord powers live production

DYNACORD HAS designed its TGX power amplifiers to be the 'ultimate amplification solution' for medium- and large-scale live performance applications. The series features two models: the TGX10 (4x2,500W at 4Ω) and the TGX20 (4x5,000W at 4Ω). The amps are also equipped with Dante networking capabilities as well as AES and analogue inputs. Each amp features 96kHz DSP with FIR Drive Technology and a signal-to-noise ratio of up to 118dB.

Included in the amps are a number of patent-pending technologies designed to offer a 'reliable and stable system performance'. According to Dynacord, the advanced protection package monitors more than 200 parameters to ensure that the amps continue to perform even in the most challenging conditions. Even with fluctuating mains power supplies, TGX amps will reportedly remain stable. Dual network ports and automatic fall-back are said to provide an extra level of redundancy and system reliability.

The TGX system rack is a modular system designed by touring professionals. The single 10 rack unit TGX system rack is pre-configured with three TGX20s plus two independent network switches. The racks offer integrated sliding doors, customisable I/O options and a reversible mounting for the power distribution. The racks can be vertically stacked and locked together to give up to 180kW of output power in the same footprint as a conventional amp rack.

www.dynacord.com

EXBOX.BLDS gets hardware update

DIRECTOUT HAS announced a new hardware version of its EXBOX.BLDS automatic redundancy switch. The hardware will ship with a modular MADI interface in order to cover all applications and formats in multichannel MADI systems. The new hardware design of EXBOX.BLDS is based on the MADI modules DirectOut uses in its SG.MADI SoundGrid interface. According to the manufacturer, users are not only able to receive any configuration of the two MADI ports as required but are also able to change this configuration in the future.

DirectOut is also continuing to develop its technical partnership with globcon in the form of free globcon support for the MADI.SRC. 'It's hard to improve a solid working product,' said Jan Ehrlich, MD at DirectOut. 'However, globcon support is really a feature that adds a big improvement to the hardware since it is now able to monitor what's going on. That's the icing on the cake for our MADI.SRC.'

Control plug-ins for the Andiamo series have also been completed, along with the management of MIDI over MADI and SERIAL over MADI features of all Andiamos via globcon. The DO.Net implementation for M.1k2 has also been developed and enables control of the Andiamo series through globcon via Ethernet UDP.

www.directout.eu

The EXBOX.BLDS MADI redundancy switch

A cascade of enhancements to KLANG's Kos

NEW 3.1 software for KLANG:technologies Kos 3 operating system has been released by the German 3D in-ear mixing system manufacturer. One of the most significant benefits of the latest OS version is said to be the inclusion of a 'powerful' new MIDI translator tool. This provides MCU (Mackie Control Universal) protocol

integration, allowing engineers to connect one or more MIDI MCU-compatible fader controllers to the KLANG:app for touch-based mix control. This enables, for example, monitor engineers that want to dial into musicians' mixes from a hardware-based controller. The new integration provides facilities for mute and solo buttons, channel labels, bank select and snapshot control, and bidirectional fader control.

Furthermore, Kos 3.1 introduces the daisy-chaining of KLANG:fabrik and/or KLANG:vier devices into a hive of units functioning as a larger and more powerful system. In this configuration, engineers can move between various artists' mixes within the cascade via the top mix bar, as well as create, save and recall snapshots and presets on all units in the setup simultaneously.

Finally, with Kos 3.1's new master cue facilities, monitor engineers don't need to sacrifice one mix for cueing into an artist's mix, but can cue into the mixes of any unit in the cascade. This is accomplished by daisy-chaining a cue output of a mixing console to the KLANG cascade and then choosing to listen to the KLANG cue or console cue.

www.klang.com

L-ISA integrates with Avid

L-ACOUSTICS HAS announced the addition of an AAX DSP version of its L-ISA Source Control plug-in for the Avid Venue S6L console's control surface. Users will have access to all 'source object' controls, including pan, width, distance and elevation, as well as a designated aux send, and all L-ISA parameters can be stored in the console's snapshots engine and recalled in the same way as other console parameters.

Portability and live interaction are cited as some of the benefits, plus the loudspeaker layout can easily be adapted to location changes while maintaining the spatial properties of the mix, according to the manufacturer. 'Sound engineers are able to use a familiar workflow and a single interface to manage an object-based mix easily and intuitively, for a variety of loudspeaker configurations, from frontal layouts to surround or 3D,' said L-ISA director of R&D, Guillaume Le Nost.

www.l-acoustics.com

Sommer goes the distance

FOR LONG-DISTANCE signal transmission, Sommer Cable has introduced a new generation of Cardinal DVM-HDBT extender systems that raise the bar for transmissions quality.

The compact devices are optimised for continuous operation and process HDMI signals up to the 2.0 standard with all common features such as HDCP 2.2, 4K, 3D, CEC as well as PCM and bitstream audio.


Cardinal DVM-HDBT

Bidirectional RS232 and infrared communication for display or beamer control is also transmitted, while the devices can be powered remotely via Ethernet (PoE). The Cardinal DVM-HDBT extender systems are available as transmitter, receiver and kit.

'When designing the new Cardinal DVM systems, we focused on a stable, zero latency transmission of HDMI signals,' explained Pascal Miguet at Sommer Cable. 'That way, uncompressed UHD content can be transferred in real-time by using only a single Cat line, and over a maximum distance of 70m.'

Cat.6 Pur Superflex

In addition to the updated extender sets, the Baden Württemberg cable specialist has launched a new outdoor cable for digital audio and network signals that is being recommended for situations where a reliable temperature resistance, a safe data transfer and at the same time a high flexibility are demanded. The Cat.6 Pur Superflex is 8mm in diameter for 4x2 wires and is available as bulkware or as a ready-made cable.

www.sommercable.com
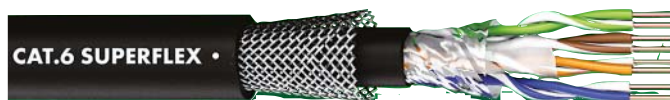
Apogee is Jam+ing

JAM+ FROM Apogee is a portable, studio-grade USB instrument input and output that has been designed to connect electric guitar, bass, keyboard or any acoustic instrument with a pickup, directly to an iOS device, Mac or Windows PC. Users can also connect a dynamic microphone with a separate adapter.

Jam+ continues the evolution of the Jam series that was rolled out in 2010 by bringing the latest advances in Apogee's design and engineering to an all-new metal chassis with enhanced PureDigital circuitry. The stereo output connects to headphones or powered speakers, while the overdrive mode reportedly makes amplifiers and effects pedals sound more realistic.

The blend mode is said to minimise delay in headphones while recording, and there is no configuration, just plug in and play. Jam+ offers 24-bit/96kHz high-resolution audio and includes lightning, USB and USB-C cables. It also comes with the BIAS FX Jam software bundle from Positive Grid which includes a premium selection of three amplifiers and six essential pedal effects.

www.apogeedigital.com

Redundant power from Lectrosonics

The Lectrosonics RPS4 power supply

THE RPS4 from Lectrosonics is a universal DC power supply with redundant internal supply modules designed as a 12V DC source for low-voltage devices such as wireless microphones, receivers, IEM transmitters, IFB transmitters and signal processing equipment. The power supply is housed inside a 1U chassis that negates the need for a separate power strip with individual DC supplies for each device.

The RPS4 supplies four 12V DC thread-locking taps, with each providing up to 1.5A. Two internal power supplies and two temperature controlled fans operate in a failover mode for an automatic backup in the event one of them fails.

Furthermore, individual 2A blade-type fuses used in cars protect each 12V tap from overload or direct short. The unit can be powered by 100V to 240V AC,

The Stereo Portable Digital Recorder (SPDR)

50/60Hz. Output DC ripple is less than 20mV. The unit ships with two 12-inch and two 18-inch DC supply cables. The RPS4 is said by the manufacturer to be the perfect companion for its Venue and Venue 2 receivers.

Meanwhile, Lectrosonics has also unveiled the SPDR, a stereo version of its PDR micro digital recorder. The SPDR is a dual-channel unit designed for use video production or as a backup recorder. It records to a Micro SDHC memory card in Broadcast Wave Format (.WAV with iXML metadata) and 24-bit depth, in sample rates of either 48kHz or 96kHz. The unit can accept inputs from analogue line level and AES digital sources, or from lavalier microphones wired for standard Lectrosonics 5-pin 'servo bias' inputs. The SPDR can be jammed with time code via an industry-standard 5-pin Lemo connector, and features a temperature compensated (TCXO) time base crystal.

www.lectrosonics.com

Shure upgrades bodypack receivers

P9RA+

Designed for live performers, broadcast production managers, sound technicians and rental agency managers, the receivers provide an analogue/digital hybrid

SHURE HAS released the P9RA+ and P10R+ bodypack receivers that operate with the PSM900 and PSM1000 Wireless Personal Monitor Systems, respectively. Both the P9RA+ and P10R+ are said to deliver enhanced RF performance while preserving the audio quality and transparency of the PSM900 and PSM1000.

system that reportedly increases headroom, stereo separation and audio fidelity.

The P9RA+ is a compact, stereo bodypack that is compatible with the original P9T and P10T transmitters and all Shure SE Sound Isolating Earphones, while the P10R+ is a low-profile, twin-antenna diversity bodypack receiver with features such as full bandwidth RF scan, precision front-end RF filtering and automatic RF gain control. Built with an integrated FPGA circuit, both receivers are equipped with advanced DSP technology that provides high-quality digital audio over analogue RF transmission, according to the manufacturer. By offering higher RF sensitivity, the P9RA+ and P10R+ reportedly deliver a cleaner RF signal and better end-of-range performance. The P10R+ is said to possess a more robust and reliable RF signal in close proximity to digital transmitters when used alongside digital wireless microphone systems in crowded spectrum spaces.

www.shure.com

From alpha to Omega

ATLONA HAS unveiled three new products that will form its Omega Series. First is the AT-OME-TX21-WP-E, a 2-gang enclosure for EU and UK wall plate openings. It is a 2x1 HDBaseT switcher with HDMI and USB-C inputs and has been designed to work with the AT-HDVS-200-RX or AT-HDVS-SC-RX scaling receivers, the AT-UHD-EX-100CE-RX-PSE receiver and Atlona HDBaseT-equipped switchers. The

use with Omega Series receivers and switchers, select HDVS Series receivers such as the AT-HDVS-SC-RX scaler, the AT-UHD-EX-100CE-RX receiver and other Atlona switchers with HDBaseT inputs.

The AT-OME-SW32 is a 3x2 matrix switcher with HDMI and USB-C inputs, and HDMI outputs. It supports 4K HDR and 4K/60 4:4:4 at HDMI data rates up to 18Gbps. Depending on the intended

AT-OME-ST31

enclosure has 4K UHD capability at 60Hz with 4:2:0 chroma subsampling. It has remotely powered PoE with an automatic input selection and automatic display control.

The other two products are the AT-OME-ST31 and AT-OME-SW32. The AT-OME-ST31 is a 3x1 switcher and HDBaseT transmitter with HDMI and USB-C inputs. It features mirrored HDMI and HDBaseT outputs. Video signals up to 4K/60 4:2:0 can be transmitted over HDBaseT up to 100m. All inputs and the local HDMI output support 4K HDR and 4K/60 4:4:4 at HDMI data rates up to 18Gbps. The AT-OME-ST31 is designed for

application, the AT-OME-SW32 can be set to specific switching modes that include mirrored outputs (default), one of the outputs fixed to an input or unrestricted matrix switching.

Both switchers are HDCP 2.2-compliant. The USB-C input is ideal for AV interfacing with newer Mac, Chromebook and Windows PCs, as well as smartphones and tablets. 4K downscaling to 1080 at 60Hz, 30Hz and 24Hz is available for one of the HDMI outputs (AT-OME-SW32) and for the HDMI output (AT-OME-ST31) when connected to an HD sink.

www.atlona.com

Switching on the move

BROADCAST PIX has introduced BPswitch RX, a portable and self-contained model that forms part of the manufacturer's line of integrated production switchers. BPswitch RX provides multi-camera production and high-end motion graphics for live production and comes complete with touchscreen display and integrated streaming to Facebook Live and other CDNs.

Ideal for concerts and other live events, BPswitch RX features

ClearKey Chromakey and Virtual Studios virtual sets are all built in, along with a customisable multi-view. The system is housed in a durable aluminium alloy chassis with a built-in handle for transport. Although BPswitch RX can be operated with the included keyboard and mouse, users can connect a traditional Broadcast Pix control panel or use the optional Broadcast Pix Commander customisable touchscreen interface.

four multi-definition video inputs, plus two IP inputs that support RTSP and NDI protocols. It also includes eight channels of clips and graphics, a built-in audio mixer, three keyers with DVEs and seven outputs. The integrated NewBlueNTX multi-layer 3D motion graphics CG includes hundreds of title styles and templates for creating and updating lower-thirds, bugs, animations, rolls, crawls and looping effects such as a glint or shine.

Programme recording, clip and graphic stores, file-based macros,

BPswitch RX provides full-motion video and access to all sources and workflow tools through a browser-based interface that can be accessed by tablet, phones and laptops. The company's BPNet IP ecosystem, powered through the ioGates cloud-based media management platform, delivers BPswitch's control-over-IP capabilities with low latency, as well as extended encryption and two-factor authentication for secure performance.

www.broadcastpix.com

Ross extends Carbonite family

HAVING LAUNCHED the Carbonite switcher seven years ago, Ross Video has extended the Carbonite family by consistently adding new features and functions to the format. The Canadian developer has revealed its next-generation mid-size switcher in the form of Carbonite Ultra. Built on an entirely new 1U hardware platform, the 24-in/14-out format Carbonite Ultra provides 240% more processing power than the original Carbonite.

Replacing the original series of production switchers, the Ultra can be configured with between one and three MEs, between two and four 16-window MultiViewers, Frame Syncs and Format Converters on all inputs and processing plus colour correction on all inputs and outputs. Following the Software Defined Production philosophy of future-proofing, added features will be introduced via free-of-charge software updates and new software-licensed functions. The next software release will unlock 12G/UHD support for 2ME and 3ME systems.

Designed for ease of control and movement between products and applications while maintaining equipment speed, Ross Video has also unveiled the Ultritouch customisable system-wide hardware

control and monitoring panel. The rack-mountable touchscreen panel balances traditional functionality where system-wide control can be conducted across almost the entire Ross Video portfolio. Other key features include DashBoard open control, button mapping and next-generation workflows via the fully integrated touch UI with multi-device navigation.

Following a trend in live production to gravitate towards integrated PTZ cameras for all types of varied content creation, Ross Video has introduced the PivotCam-SE. Featuring a new 12.4 megapixel, ½-inch CMOS sensor, the PivotCam-SE captures 1080p HD video and offers a 3G-SDI output and an external synchronisation (Genlock) input. The PivotCam-SE's Ethernet interface offers the option for single cable connectivity, providing remote control via IP Visca protocol, video output using 4K UHD IP streaming and PoE over a standard Cat-5e cable. The optical stability of the PivotCam-SE has been enhanced with the addition of a second arm, ensuring a clean and stable image, even on the tightest shots provided by the 23x optical and 2x lossless digital zoom.

www.rossvideo.com

Mounting support for projectors

DESIGNED FOR venues where products may change on a regular basis, Peerless-AV has unveiled its Large Venue Projector Mount (PJR250). Said to provide a 'quick, safe and simple installation', the PJR250 features a low-profile, pre-assembled design with a Hook-and-Hang system that provides a large landing area when securing a projector to the mount. The adaptor plates place the centre of gravity in the middle of the mount, achieving the 'perfect balance' when ceiling- or flush-mounting a projector,

PJR250

according to the manufacturer. The plates are said to reduce installation time by eliminating the need to install legs. The PJR250 features horizontal alignment up to

3 inches as well as tilt (+15°/−5°), roll (±5°) and swivel (360°).

Peerless-AV has also added two solutions for the 55-inch Samsung Flip: the RMI3-Flip and SR560-Flip.

As a result, the Samsung Flip can be mounted on a wall or mobile cart. Once mounted, the negative tilt and rotation is said to allow users to easily write or sketch in landscape or portrait mode. The rotational interface on both the wall mount and cart allows users to rotate the display from portrait to landscape, and holds the display at a negative 4.5° to promote a more natural, angled writing surface.

www.peerless-av.com

Bit-by-bit management of AV with IT

AS A house of worship technician, you may have noticed the convergence between IT and AV technologies. Audio and visual systems are frequently

DSFB124NL-ST

run over IT networks today and, to help manage the wide array of interconnections and cross-connections, as well as complex AV architectures, Bittree has created the DSFB124NL Series of patch panel enclosures.

The first member of the series is the DSFB124NL-ST, which features simplex ST-to-ST connections. This was quickly followed by the introduction of the DSFB124NL-LC, accommodating duplex LC-to-LC

connections. Both the DSFB124NL-ST and DSFB124NL-LC are built for single and multi-mode fibre applications and are constructed to a 1U form factor.

DSFB124NL series systems include steel gliding rails, making it easier to access connections once they have been installed. They come with grommets, cable strain reliefs and bend radius guides, as well as knock-out positions on all four sides. The enclosures are themselves constructed from cold-rolled steel with a durable black powder-coat finish.

www.bittree.com

Vaddio captures a PrimeShot

VADDIO'S PRIMESHOT 20 HDMI HD PTZ camera has been released to suit those requiring high-definition video capture but with tight budgets to adhere to. It includes a range of output options, such as S-video, in addition to HDMI. The manufacturer states that it is 'ideal for houses of worship and lecture halls'.

The PrimeShot 20 HDMI has a 20x optical zoom with a 55° horizontal field of view, a 2.12 Megapixel (effective), native 1080p/60 full HD image sensor, and features HDMI 1.3, S-Video and IP streaming outputs that can be used simultaneously.

Included in the box along with the PrimeShot 20 HDMI are a thin, profile wall mount with mounting tools, Vaddio's IR Remote Commander and 12 VDC, 3-amp switching power supply sets with AC cords. A web-

based user interface allows remote configuration, management and control. With pan and tilt movements of up to 90° per second, the PTZ camera can also be integrated with Telnet or serial RS-232 control.

www.vaddio.com

Telemetrics OmniGlides into position

THE OMNIGLIDE Roving Platform joins Telemetrics' family of robotic camera products to allow camera operators to crab or spin without losing camera orientation. The system, found in the Telemetrics catalogue under the model number RRP-1, is designed for smooth and continuous motion with direction changes and along curved paths.

OmniGlide offers several modes of operation. Users can use a remote control for joystick handling in a XY-plane, as well as setting up point-to-point timed and synchronised preset positions, key frame motion through multiple points, record and playback movement and autonomous reFrame motion. Meanwhile, the manual control mode is designed for local operation.
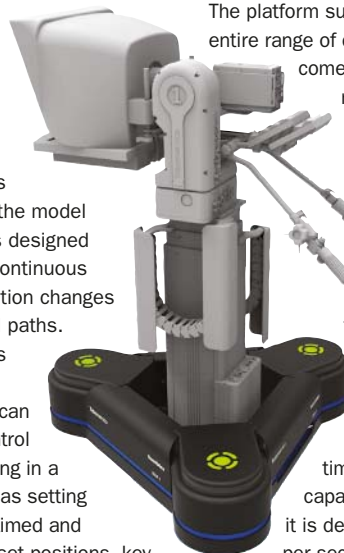
XY-plane scanners sense obstructions in OmniGlide's path within a 5m radius to avoid collisions and automatically orientate the system. A real-time servo system for optimal control and advanced capabilities is also included with fully redundant electronics and electronic communication functions. OmniGlide

RRP-1-1

also has self-fault monitoring capabilities, auto-disable and is built with an 'ultra-rigid' chassis. The platform supports Telemetrics' entire range of column actuators and comes with a detachable rear panel to assist with installation.

Telemetrics' pan/tilt family has also gained a new member in the form of the LP Servo pan/tilt head (PT-LP-S5). It offers support for keyframe motion as well as sudden motion time changes. Its load capacity is up to 40kg and it is designed for speed (90° per second) while remaining quiet. LP Servo's LED status indicators display power and health statistics, while buttons on the unit drive any axis and set soft limits.

The dual-cradle design of LP Servo is intended to simplify integration. Other features include an embedded red and green tally, a web app for control, configuration and monitoring, redundancy for camera control, robotics control and an embedded network switch with three ports.

www.telemetricsinc.com

Vinten goes with the flowtech

VINTEN STATES that its flowtech carbon fibre camera tripods have 'the world's fastest-deploying legs', as well as quick-release brakes and adjustable levers for quick and easy set up. The first product in the range is the flowtech 75 tripod, which is compatible with 75mm fluid heads.

With a set of two-stage legs and a mid-level spreader, rubber feet and a payload capacity of 20kg, the flowtech system's quick-release brakes ensure the legs are deployed simultaneously, adjusting automatically to the ground. A hinge-lock mechanism allows for the capture of extremely low, ground-level shots without the need for additional 'baby legs'.

flowtech 75 is designed to be lightweight and easy to transport with magnetic locks that the legs fix to in transit. A detachable carry handle and a compact dolly are available as optional extras.

Vinten has also released new ceiling track and floor track systems

flowtech 75

in collaboration with Tecnopoint. The Vinten Hexagon floor track system is built for easy assembly and so that no cables run outside of the track. Along with the ceiling track solution, Hexagon fully integrates with all Vinten robotic camera supports.

www.vinten.com

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www.kobashow.com

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Faster postproduction workflows

BLACKMAGIC DESIGN has announced the public beta of Blackmagic RAW, a codec that 'combines the quality and benefits of RAW with the ease of use, speed and file sizes of traditional video formats'. The codec features technologies such as an advanced de-mosaic algorithm, metadata support and optimised GPU and CPU accelerated processing. It can be used from acquisition throughout postproduction for editing and colour grading.

Blackmagic RAW moves part of the de-mosaic process into the camera where it can be hardware accelerated by the camera itself. This, according to the manufacturer, results in efficient encoding that gives customers the same quality, bit depth, dynamic range and controls as RAW, but with better performance and smaller file sizes than most popular video codecs. Because the processor intensive partial de-mosaic is done by the camera hardware, software such as DaVinci Resolve doesn't have to do as much work decoding the files.

As the image data, along with the unique characteristics of the image sensor, are encoded and saved into the Blackmagic RAW file, users reportedly experience better image quality, even at higher compression settings, as well as control over features such as ISO, white balance, exposure, contrast and saturation. Images are encoded using a custom, non-linear, 12-bit space designed to provide the maximum amount of colour data and dynamic range.

Users can download the public beta for use with Ursa Mini Pro cameras via the Blackmagic Camera 6.0 beta update, while the DaVinci Resolve 15.1 update also includes support for Blackmagic RAW.

www.blackmagicdesign.com

Transitioning to IP

NEWTEK HAS produced an NDI Software Developer Kit to allow developers and manufacturers to implement the NDI protocol, NewTek's Network Device Interface technology, to enable IP connectivity and video transfer between devices. The kit supports finding, sending and receiving any number of video streams over IP, with the encoding algorithm supporting all video resolutions and frame rates up to 4K and beyond, as well as 16 channels of audio and beyond. It also includes tools to implement video access and grouping, bidirectional metadata and IP commands.

Also new from the IP video technology specialist is the NC1 Studio I/O module that translates up to eight compatible video sources to SDI or NDI for input, output or a combination of both. The module can also be configured for dual-channel 4K ultra HD at 60fps with support for 3G-SDI quad-link grouping. It can be integrated with compatible systems and devices for switching, streaming, display and delivery, and allows users to stack modules in a single location or station in multiple locations.

Other features include a built-in video server function with extensive file format support, including full-resolution 4K

NC1 I/O IP

UHD playback; real-time input, conversion and transmission of common IP video stream formats, including RTMP, RTSP and HTTP; and flexible audio integration supporting input and delivery of digital, analogue and network audio, including Dante and AES67.

www.newtek.com

Affordable live production

JVC's RM-LP100 controller

THE ProHD Studio 4000 from JVC Professional Video is a self-contained, 4-channel system that includes a complete control room solution for smaller, budget-conscious facilities. It includes four SD/HD-SDI inputs, four IP stream inputs and four NDI inputs. An additional HDMI/NDI input with keying can capture an external screen, so users can include content from a smartphone or PowerPoint presentation. Users can record the programme output and the streaming output, along with simultaneous ISO recording of all cameras, directly to the ProHD Studio 4000.

Features include automatic motion tracking for JVC KY-PZ100 PTZ cameras, as well as Zero Config, which provides automatic, one-click configuration of any IP-enabled JVC camera when it joins the same LAN as other JVC cameras. The ProHD Studio 4000 also includes an integrated remote control for JVC cameras, including full PTZ control for the KY-PZ100.

A built-in H.264 encoder supports up to 1080p streaming at up to 10Mbps, with RTMP and MPEG-TS simultaneous output and direct streaming integration to Facebook Live and other CDNs. Output choices include dedicated HD-SDI and HDMI ports, plus an HDMI display port for multi-view or programme monitoring. Other features include an integrated audio mixer, internal CG with templates, four layers of DSK and a production switcher with a choice of transitions and automated switching modes. The ProHD Studio 4000 supports instant, unlimited clip playback without transcoding, as well as unlimited playlists with PIP and split screen layouts.

In other news, JVC has upgraded its RM-LP100 remote camera controller to enable tally compatibility with Roland's V-60HD switcher. The RM-LP100 retrieves tally signals from the V-60HD and distributes them via LAN to the KY-PZ100 PTZ production camera and other IP-enabled ProHD, 4KCam and Connected Cam models. By sending tally information through

Roland's V-60HD

the LAN port, users eliminate the need for separate tally cables between the switcher and cameras, which simplifies installations and streamlines workflow.

www.jvcpro.eu
www.roland.com

Kona the fifth

KONA 5 is a new eight-lane PCIe 3.0 video and audio I/O card from AJA, supporting 12G-SDI as well as HDMI 2.0 monitoring and output. Supporting 4K/UHD and HD frame rates, deep

HDR/WCG converter adds Colorfront Engine support for new HDR output transforms, updated BBC v1.2 HLG LUTs, new BBC v1.2 HLG LUTs, the ability to upload and store custom

Kona 5

colour and HDR workflows via a single cable, Kona 5 can facilitate multiple 4K streams with its multichannel 12G-SDI I/O.

The capture and output card is compatible with third-party tools such as Adobe Premiere Pro, Apple Final Cut Pro X and Avid Media Composer. Kona 5 also supports simultaneous capture and pass-through monitoring via 12G-SDI, in addition to HDMI 2.0 output for connecting to modern displays. 'Kona 5 combines the flexibility of AJA's Io 4K Plus into a desktop I/O solution with a more powerful feature set,' noted Nick Rashby, AJA president.

AJA has also increased its range of IP mini-converters with the IPR-10G2-HDMI and IPR-10G2-SDI SMPTE ST 2110 video and audio receivers. They feature dual 10 GigE SFP+ cages enabling hitless switching for redundancy protection and support for bridging UHD or HD signals over IP to HDMI or SDI.

And, as well as introducing new solutions, AJA has released a series of updates for existing products. The v2.6 update for the FS-HDR real-time

3D Cube LUTs to FS-HDR using the web GUI and ganged operation of Colorfront Engine parameters.

The Helo v3.0 firmware update introduces RTMPE support for Facebook, enhanced HTTPS security, and Chinese, Japanese and Korean language support in the system's web UI.

Finally, the Ki Pro Ultra Plus' v4.0 firmware includes multichannel independent file naming capabilities, forced rollover functionality that allows users to push a recording to a second AJA Pak media slot during capture, moveable timecode and analogue audio mapping.

www.aja.com

IPR-10G2-HDMI

Avolites unlocks 4K playback

THE AVOLITES Ai Q3 Server unlocks 4K playback through a single DisplayPort 1.2 connection. Combined with two additional DVI

Ai software. It offers industry-standard connections to the rest of the system, as well as the firepower to drive the

outputs, the Q3 is described by the manufacturer as 'the perfect solution to power live events, installs and anywhere else that live video manipulation is required'.

The Q3's hardware is said to be the ideal vehicle for Avolites'

company's built-in live effects and support Notch integration. The front-mounted screen allows configuration of outputs from outside the OS.

www.avolites.com

ArKaos connects with NDI

ARKAOS HAS updated its MediaMaster Pro media server software, MediaMaster Express video control software, Grand VJ real-time video mixer software and Grand VJ XT (an extended version of GrandVJ 2) to integrate NewTek's NDI (Network Device Interface) protocol. This means that all four products can be recognised as a source by other NDI-enabled applications and devices via an Ethernet LAN. Michael Kornet, executive vice president and general manager of NDI at NewTek, stated that 'NDI-enabled devices exponentially increase the video sources available for live productions'.

NewTek's NDI technology is royalty-free and allows video and audio sources to be shared across a network in both directions, negating the need for infrastructure upgrades. 'NDI will auto-discover the sources and receivers on the network and will happily coexist with other protocols used in the lighting industry,' explained ArKaos CEO Marco Hinic, also noting how another aspect that attracted ArKaos to NDI was its low latency.

www.arkaos.net
ndi.newtek.com

Signal distribution made simpler

ELC LIGHTING has designed its DLN8GBXSL eight-port slave node to simplify Ethernet/DMX network distribution for live entertainment applications. The DLN8GBXSL acts as a substitute for a DMX splitter rack, where all DMX ports are fully programmable as output, input, merge or backup, as node ports.

Designed as a slave to the dmXLAN switch (GBx10 or GBx18), the DLN8GBXSL forms part of ELC's GBX Distribution System. This switch is the master, and up to 15 slave units can be daisy-chained via the Ethernet ports.

The system supports all open protocols including sACN, Art-Net and ShowNET. The DMX ports can be configured via the user interface of the switch or with the dmXLAN software. Up to 15 DLN8GBX8SL slave units can be connected to the switch, resulting in a system rack with 120 fully programmable DMX/RDM ports. Both nodes offer data splitting, merging, softpatching and backup when programmed using dmXLAN.

www.elclighting.com

The sharpest tool in the box

RAYZOR 760 is a compact yet powerful LED wash effects luminaire and the first fixture to feature Elation's new TwinkLED system. With a wide zoom range from 5° to 77°, Rayzor 760 provides mid-air beams with over 8,000 lumens, as well as a wide and even wash coverage. The luminaire is driven by seven, independently controlled, 60W RGBW LEDs, while the oversized front lenses create a large surface that is enhanced by the patent-pending TwinkLED technology. TwinkLED consists of 28 individual white LEDs placed inside the lens to create an additional layer of effects, allowing designers to access new ways of creating interest on stage, according to the manufacturer.

Rayzor 760 is also available in a compact and lightweight weather- and dust-protected IP65 version, Proteus Rayzor 760, for use in any environment and under adverse

Rayzor 760

conditions. The Proteus Rayzor 760's design reportedly makes it the world's first IP65-rated luminaire with continuous pan and tilt rotation.

Elation has also added an IP65-rated version of Smarty Hybrid, the Proteus Smarty Hybrid. Encompassing the same feature set and using the same Philips MSD Platinum Flex 200 lamp with a 6,000-hour lamp life, the Proteus Smarty Hybrid's IP65 dust and water protection means the fixture can be used indoors or out. Features include fast movement, motorised zoom, full CMY colour mixing, 13 dichroic colours, two gobo wheels, prism overlay and frost filter.

Artiste Van Gogh is the latest addition to Elation's Artiste range of

Proteus Smarty Hybrid

Artiste Van Gogh

luminaires. It provides up to 16,000 total lumens from a 380W high CRI LED engine, while CMY and CTO colour mixing and a seven-position colour wheel provide flexible colour options. An internal four-blade barndoor system reportedly allows for beam shaping and light control at any angle. The luminaire comes with a wide zoom range and choice of PC or optional Fresnel lens.

www.elationlighting.com

Accentuate the positive

ALTMAN LIGHTING has introduced its AP-150 RGBW LED PAR luminaire designed to accentuate any theatrical or architectural lighting design. It is described by the manufacturer as a compact and lightweight 135W wash that produces deep, saturated colours and soft, delicate pastels, while maintaining a smooth, uniform beam throughout the entire motorised zoom range. Weighing under 5kg, AP-150 replicates the soft output of a traditional PAR wash with control states from 8-bit, 16-bit, RGB and HSIC. The factory and custom colour presets reportedly allow for the quick selection of most widely used

entertainment colour choices, while the light also provides the ability to record colour presets directly to the luminaire for custom colour playback.

The AP-150 also offers a variety of strobe options, ranging from pulse to fade, to a 30Hz strobe rate. The motorised zoom produces a beam spread between 12° and 65°, while the luminaire also has built-in stops at five different set points for precise beam spread repeatability. A 'tech identify' option flashes the fixtures LEDs without disrupting focus.

www.altmanlighting.com

Cinestar in the sky

CINESTAR IS the latest lighting solution from Airstar for both indoor and outdoor requirements. The lighting balloon boasts a 120° fill light diffusion and an embedded LED light source (850W).

Reportedly taking just 15 minutes to set up, the air-inflated Cinestar is mounted on a tripod, weighs 12kg and is 160cm in diameter, producing 'even and non-glaring light'. The manufacturer states that it offers a lifespan of more than 50,000 hours and colour temperatures that can be 'instantly tailored' from a warm 2,700K to a cold 6,500K.

Making use of Airstar's Dynamic White technology, Cinestar is also designed with 31kHz flicker-free technology.

'This product sets itself apart from the competition thanks to a 120° opening with 50% of the total illumination, its weatherproof feature which makes it perfect for outdoor use and its circular shape offers beautiful reflections,' explained Airstar sales manager, Xavier Ponson.

Cinestar

Meanwhile, Airstar has launched Neo, its latest inflatable lighting structure inspired by neon tubes. Offering a brightness of 8,500 lumens and measuring 5m x 20cm (LxW), Neo can either be installed on the ground or mounted. 'It may sound odd, but the Neo concept could be described as a genesis of the Jedi lightsaber and my grandmother's kitchen neon', explained Jean-Pierre David, one of Airstar's industrial designers.

www.airstar-light.com

GLP turns heads

TARGETING THE broadcast segment and showcase events, GLP has released an LED moving head companion to its impression S350. The manufacturer claims that the moving head offers a flicker-free operation with smoother electronic dimming and multiple dimming curves, while eliminating colour shift when delivering random and pulse electronic strobing effects. Meanwhile, its high colour temperature of 7,500K claims to provide a hard-edge, mid-air effect beam for brighter gobo projections.

The impression E350 houses a CMY colour mixing system with separate CTC Channel, along with an eight-facet prism, a light and

impression E350

heavy frost, two gobo wheels, a 14-blade iris and a 10-slot colour wheel plus 640° pan and 262° tilt in 16-bit resolution. 'Our first priority was to get maximum output and efficiency from a 350W LED engine, with intensive 7,500K default white, as we knew this would be perfect for mid-sized shows or wherever compact form factor and low weight are required.

In fact, the E350 outputs up to 9,500 lumens at maximum 550W power consumption,' said GLP product manager, Michael Feldmann. The LED engine also includes an adjustable animation wheel for horizontal, diagonal and vertical animation effects and weighs in at just 24.5kg.

www.glp.de

Bora-S brings aerial effects to large venues

FOR BIG venues, including outdoor and indoor arenas and large houses of worship, Ayrton has launched Bora-S, an LED washlight with gobo projection

Bora-S

and framing functionality to produce aerial effects. The fixture is also designed to be compact, leaving a similar footprint to the manufacturer's Ghibli light.

Bora-S produces an output of 38,000 lumens from an 8,000K white LED engine. This reportedly draws on 750W of power, which Ayrton states is a fraction of the power consumption required by similar LED fixtures. The light includes a 178mm PC (perspective control) front lens, an 8:1 zoom with a beam range between 8° and 64°, full field framing functionality, an iris, a rotating gobo wheel, a pair of colour wheels and a full

CMY + CTO colour system with a CRI of more than 70.

The letter S appears at the tail end of another new Ayrton fixture. Khamsin-S is an automated LED profile spotlight, which the manufacturer claims is the 'brightest on the market'. Utilising the same 750W white LED engine as Bora-S, Khamsin-S features two rotating gobo wheels, an animation wheel, full field framing, two prisms, an iris, two frosts, two fixed colour wheels and a full CMY + linear CTO colour system, as well as a 9:1 zoom with a 6.5° to 56° beam range.

TC (True Colour) versions of both Bora and Khamsin are also available on request from Ayrton. Bora-TC and Khamsin-TC offer a higher CRI.

www.ayrton.eu

Khamsin-S

Brighter beam effects

CZECH LIGHTING manufacturer Robe has updated its moving light range, Spikie, to create a brighter, larger beam. The 250W RGBW LED multichip SuperSpikie features an optical system with a zoom of 3.5° to 42° and includes two rotating gobos for producing smarter aerial effects. The movement of the light source has been updated

for smoother colour mixing and the fixture now has a variable CTO range between 2,700K and 8,000K with popular tungsten effects, including red-shift and thermal fade. The vari-speed double rotating flower effect of the Spikie has been retained and a 1-3 facet circular prism allows for more creative options than the older edition, all packed into compact housing weighing 16kg.

www.robe.cz

On tour with Ministry of Music

Ministry of Music offers churches a wide range of Christian artists including singers, bands, worship leaders, DJs and dance troupes as well as technical services for special events

Mike Maidment, Ministry of Music founder and CEO

Gospel group Voices Beyond

'MINISTRY OF MUSIC'S VISION IS to support and bring together UK Christian artists and event organisers in order to resource the church in its worship and outreach to the community, equip more Christian events with quality music and use the ministry of music to bring people closer to God,' explains Mike Maidment, founder and CEO of Ministry of Music (MOM). 'In 2001, I had a vision for a music ministry to help support and develop Christian bands and artists resource the church in its worship and outreach to the community. Since then, God has taken me on a journey where I have played in and managed Christian bands, managed the Christian youth charity Eden's Project and managed a wide range of music projects at Christian charity New Generation Music. But, at the beginning of 2010, God made it very clear that the time was right to pursue the vision He had given me to establish MOM.'

Understanding that music can be a powerful and culturally relevant way to spread the Christian message in today's society, particularly when reaching out to the younger generation, Mike wanted to see more Christian events taking place

Jon Kendall performing at the Kingstock festival

and wanted to provide a service to help facilitate this.

'From experience, Christian artists often find it difficult to find Christian events to play at and Christian event organisers struggle to find the right artists to resource their events at prices they can afford,' he explains. 'MOM aims to improve this position by building up a UK network of Christian artists, from new acts through to established performers, and making them available to Christian event organisers across the UK.'

In 2013, Mike established an advisory team, which ultimately led to MOM becoming a registered charity in 2015. 'It is anticipated that this new charitable status will enable MOM to create a long-term legacy for future generations,' Mike explains.

The organisation has supplied its services for more than 500 events to date, receiving positive feedback from event organisers and establishing partnerships with other Christian organisations that have seen the demand for its services grow year-on-year. 'Most importantly, the vision of drawing people closer to God has been evident at many events where people have become Christians and

lives have been impacted by God,' says Mike.

MOM currently works with a roster of 30 artists, including singers, bands, worship leaders, DJs and dance troupes, catering for a wide variety of music styles and covering almost the whole of the UK. Other services it offers for events include PA and lighting equipment, and sound and lighting engineers.

'The wide range of events MOM works on includes community outreach events, youth events, school missions, church services, church cafés, conferences, festivals and training workshops. These range in size from a solo acoustic singer performing at a small café through to a few groups working in schools for a whole week with a large end-of-week concert. The events can require the artists to perform a set of songs or dance routines, lead worship and often provide a spoken Christian message. At some events, the artists also provide training, such as music and dance workshops, RE lessons in schools and worship seminars at churches.'

With such diverse performances taking place across a wide range of environments, how does MOM ensure it always has the right technical setup?

'MOM doesn't provide the PA and lighting systems to event organisers directly but works with a few PA providers to facilitate this,' Mike explains. 'A lot of the smaller event organisers we work with often have a tight budget so, if they don't have their own PA, things can get expensive for them if they have to hire a band and then a separate PA/lighting solution. MOM is keen to support them by offering a good-quality package at a price they can afford.

'The systems we provide range from a standard PA and lighting package with an engineer for the band. A typical setup for a small- to medium-sized venue would be: front of house speakers suitable for the size of venue; mics; leads and DIs for vocals; guitar, bass and drums; monitors with separate mixes; and lighting suitable for the size of the stage. Of course, this standard setup doesn't work for every event or venue, so our PA providers are also very versatile and can provide smaller, larger or more technical setups depending on the event requirements.'

www.ministryofmusic.co.uk

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