

Singing with one voice

Singapore's Church of God suffered from such harsh acoustics that the congregation wouldn't sing, but that's all changed now, as **Richard Lawn** explains



Church of God on Alexandra Road in Singapore; Celab Chan, Clarice Ong, Isaac Eng and Raymond Loy

LOCATED ALONG ALEXANDRA ROAD

in Singapore, Church of God acquired its site in 2002, converting a former jewellery manufacturing centre into a four-storey house of worship. The luxury of rebuilding wasn't an option and so the church's functions are somewhat compromised by the depth of the building. With unintelligible audio and time delays, it was a challenge to get the whole congregation singing together.

Although the church underwent a renovation in 2008, the audio system wasn't a high priority initially as the worship services were conducted traditionally with prayers, sermons and hymns led by a pianist and choir. The church was designed in 2003 following the SARS epidemic and curtains, fabrics and materials that cure tricky acoustics were not in vogue at the time and weren't used. The 500-capacity sanctuary on the third level is fitted with a mixture of tiles, floor to ceiling glazing and plaster, further aggravating the acoustic problems inherent with the elongated shape of the room. The problem is further compounded by an extension at one end of the hall, which some church members refer to as a



'cave' owing to its funnelled nature and reverb.

The Church had the wisdom to turn to industry experts for help. Isaac Eng, a sound engineer from IPK Broadcast Systems, responded to the call. 'It was a challenge to clearly hear what was spoken as there was very poor intelligibility through the existing sound system,' he recalls. 'The acoustics of the hall could not be treated without major renovation work and so a sound solution was required to improve audio clarity and meet the expectations of the congregation.'

'From my experience with column speakers and line arrays, I knew that TOA could provide the church with speakers that could provide intelligible audio with focused directivity,' Mr Eng adds.

In a joint-effort between TOA Electronics in Singapore and IPK Broadcast Systems, a solution was proposed using the SR-S4L two-way line array speaker. The SR-S4L configures a line array by arranging speaker elements vertically close to each other. The 600W-rated wall mounted speakers each combining eight 4-inch cone drivers and 24 1-inch HF drivers provide a sensitivity of 94db SPL within a frequency range of 70 to 20,000Hz. Weighing just 16kg, the SR-S4L is an unobtrusive system measuring just 160mm (W) by 895mm (H) and 255mm (D). Four of these speakers have been installed at regular intervals along the wall. With a controlled sound dispersion, the SR-S4L speakers are highly efficient in minimising floor and ceiling reflections, making them resistant to feedback.

Both pre-existing and new speaker

directive speakers create very little sound reflections even when there are few people in the hall.

In order to further reduce the live piano sound delay and echo that hindered the congregation from singing together, Isaac recommended dispensing with the open microphones and installing an Audio Technica U891R X-Y boundary microphone within the baby grand piano, allowing its lid to be closed. With the newly installed boundary mic, the piano is properly amplified into the sound system and can now be clearly heard.

'We enjoy being presented with challenges and finding solutions that make our customers happy and satisfied,' Mr Eng added. 'Job satisfaction comes from delivering solutions that run on their own without our phones ringing with requests for unfinished tasks. Fixing sound



Four TOA SR-S4L wall mounted speakers have cured the intelligibility

cablings was installed to connect the four TOA SR-S4L speakers to a single TOA DA-250F digital amplifier in the control room. Delivering 250W by four channels (4-ohms output) using a switching power supply, the audio signal from the DA-250F is then digitally processed via a TOA DP-K1.

The DP-K1 plays an important role in enhancing the SR-S4L's resistance to feedback. Utilising its unique Automatic Resonance Control (ARC) function, the measurement of sound field, acoustic analysis and generation of digital filtering is automatically carried out. This function allowed the TOA and IPK engineers to tune the speakers according to the room's shape and acoustics. Presets were made to be used for a half-filled and fully-filled hall setting, although the Church admits that this function is rarely used as the

reflection problems and acoustically treating a room can be costly and it destroys the natural ambiance of the room. In the case of Church of God, the solution is simply ensuring that the audio is directed to the listener's ear. This is made possible by TOA's directive line array loudspeaker, the SR-S4L.'

Having successfully solved the audio problems in the Sanctuary, the same team has been asked to review and offer sound solutions for the upper and lower floors, which act as overflow and meeting rooms and are all interlinked to the Sanctuary control room. The upgraded sound system has made a world of difference and the Church is happy that the congregation can now sing with one voice and in full harmony.



A DP-K1

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