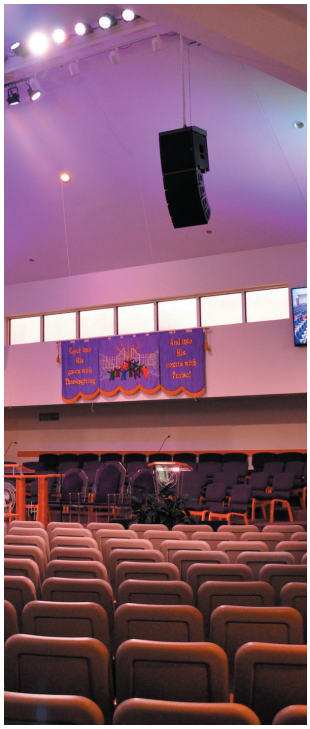
System Design

HOUSES OF WORSHIP

Unite Your Audience
The Martin Audio Experience

MARTIN AUDIO
LONDON



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Introduction

All venues require specific attention to their coverage needs, desired SPL and, of course, aesthetics. Choosing the right system will ensure that the designer fulfils as much of clients' criteria as possible.

For houses of worship, the key factors to consider are the size and shape of the building, the style of worship, and the volume levels required. Martin Audio offers a range of solutions, delivering rich, clear sound that envelops the entire congregation leading to an uplifting experience, a stronger community and a thriving House of Worship.

Please note the distribution graphs presented in this document are not absolute and represent direct SPL only.

If you require any assistance with your specific project, please contact **technical@martin-audio.com**

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LONDON

Choosing Loudspeaker Systems for Houses Of Worship

CDD Series

Point Source

Point Source solutions are suitable in smaller sized houses of worship as a main system, or medium venues as part of a distributed system. Both horizontal and vertical dispersion should be considered in the system design to ensure the model of loudspeaker selected can provide appropriate coverage to get the most even sound quality possible for the congregation.

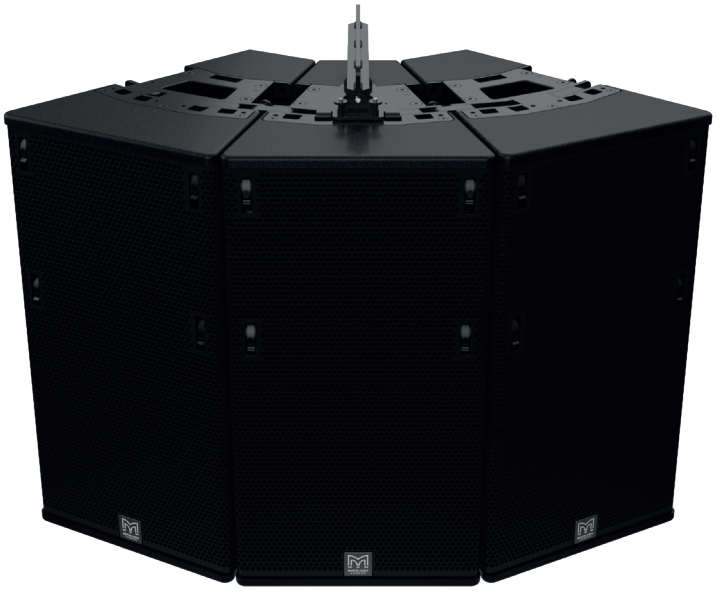
Deployment height is a factor in any system but even more so in point source solutions in order to ensure even coverage throughout the audience area. Increasing the loudspeakers' height increases its distance from the nearest listener but does not greatly affect those towards the back of the venue. This is a useful technique to eliminate listener fatigue from high SPL for those members of the congregation closest the front whilst maintaining an inclusive level at the back. Equally, systems placed at height can be made more natural with the addition of a front fill system. The correct alignment and level matching can help lower the acoustic image for the front rows creating a more natural listening environment.

Small point source speakers are also used for larger installations where "fill" may be required, for example obscured under balcony regions or along the lip of a stage to cover seats at the very front.

Martin Audio has a wide portfolio of point source loudspeakers with SPL and dispersion characteristics that will suit the most demanding of system deployments. CDD series is particular popular given its aesthetics and the combination of an asymmetric coverage pattern and a coaxial driver mean exceptional consistency in their coverage area.

Constant Curvature

Constant curvature solutions are perfect for medium venues where a point source systemcannot fulfil the dispersion requirements, but the extended near-field performance of a line array is not necessary. A constant curvature array can deliver point source directivity with the bespoke output characteristics and flexibility of a line source.



TORUS

Wavefront Precision

DISPLAY Software

arrays and the DSP pre-sets within them, ensuring every system is tailored to the venue requirements. Our range of optimised line arrays span from our O-Line micro line array to our large format WPL system; all of which have the advantage of bespoke DSP settings from DISPLAY software ensuring coverage, consistency and control.

TORUS T12 cabinets offer flexible deployment options, both vertically and horizontally toensure even distribution throughout the congregation. The adjustable HF dynamic horn flare allows for further refinement to suit the specific needs of any venue. This flexibility ensures the listeners position is heavily weighted to the direct signal rather than the reverberant; delivering clear, intelligible, and rich audio.

SX Subwoofers

Line Arrays

Line array systems are best deployed in medium to large venues where the congregation is sitting at a distance from the main PA system. The signal from a line source will degrade in SPL over distance less than that of a point source system. For this reason, line arrays lend themselves to these far throw venues where venue coverage and intelligibility is just as important at the back row as the front.

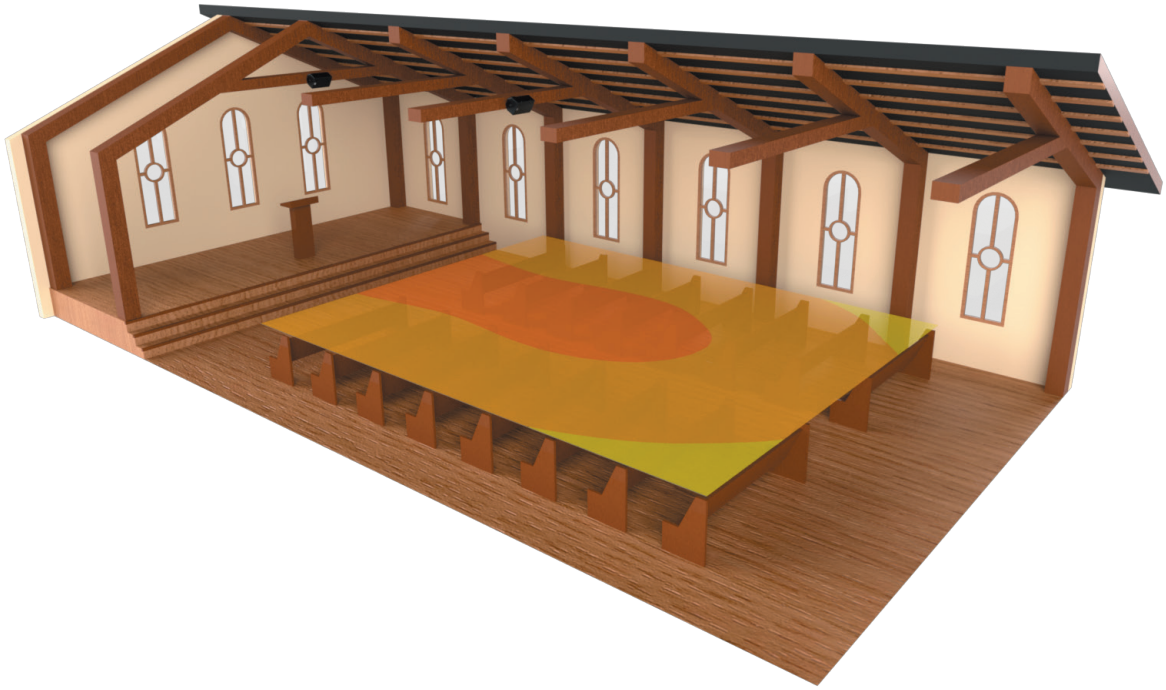
Martin Audio's optimisation technology enables the mathematically calculated articulation of

Subwoofers

Subwoofers can be used in any system where the extended LF response is important to the accurate reproduction of the audio content. The SX series showcase a wide range of subwoofers, utilising a range of technologies to help extend any system performance. Thoughtful LF design can reduce noise complaints, improve the impact of a system, and reduce the disparity of SPL across the audience in the lower frequencies.

Local Community House of Worship

100 Capacity



Requirements
- Speech and background music
- Average SPL of 103dB

Loudspeakers in system
Mono Blackline X8 flown above the preaching area with a further X8 deployed as a delay.

Accessories
- WB6/8B

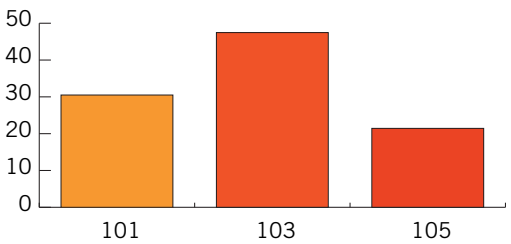
Amplification and DSP options
- DX0.5 / DX4.0 with VIA2502
- iK81

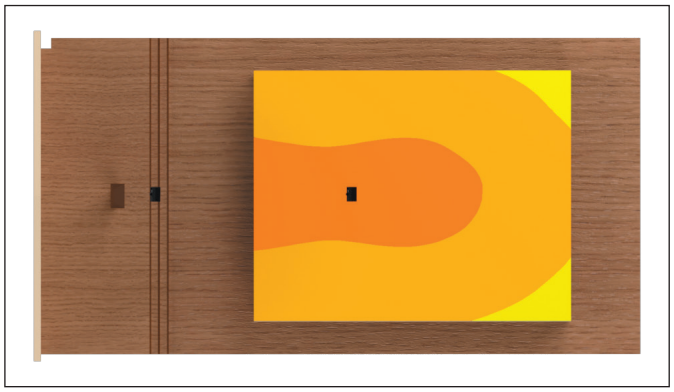
A small community worship space, with a simple requirement to improve speech intelligibility, and play back background music or to support video playback.

In this example, two Blackline X8 loudspeakers mounted to the roof beams. Both loudspeakers have their signals delayed so the focus remains at the preaching position, allowing the congregation to experience the vocal content naturally.

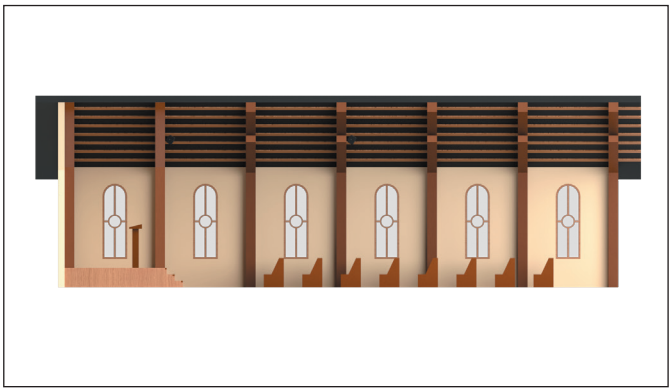
If extended low frequency is required a low-profile subwoofer, such as SX210, can be added to the system.

Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)





Plan View

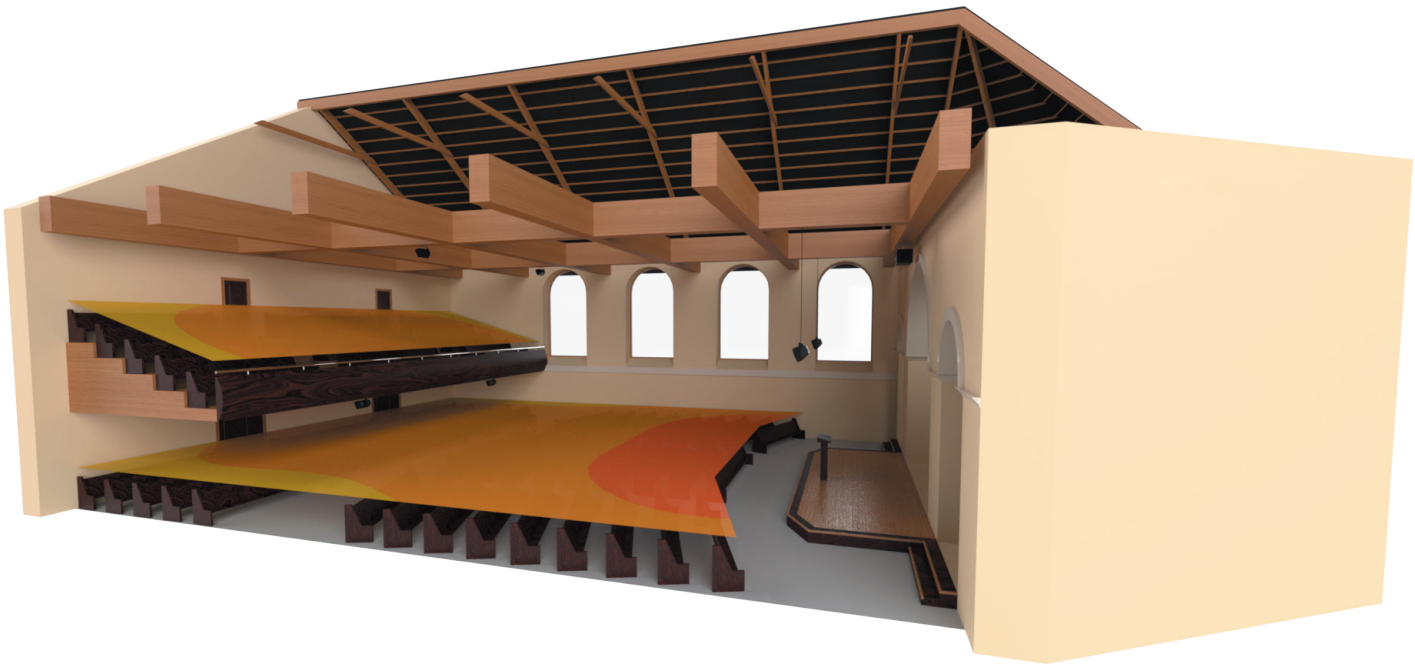


Side View

Wiring Schematic

Small to Medium Traditional Worship Space

550 Capacity



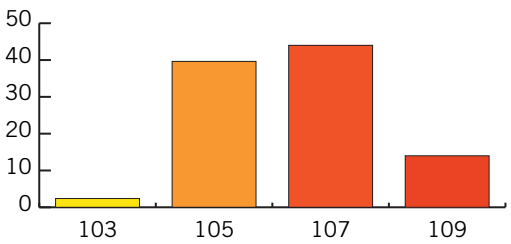
Requirements
- Speech and Stereo background music
- Average SPL of 106dB

Loudspeakers in system
- CDD12
- CDD8
- SX212

Accessories
- CDDYA12B-WR
- CDDCB6/8B

Amplification and DSP options
- DDX0.5 / DX4.0 with VIA 5004 & VIA5002
- iK81

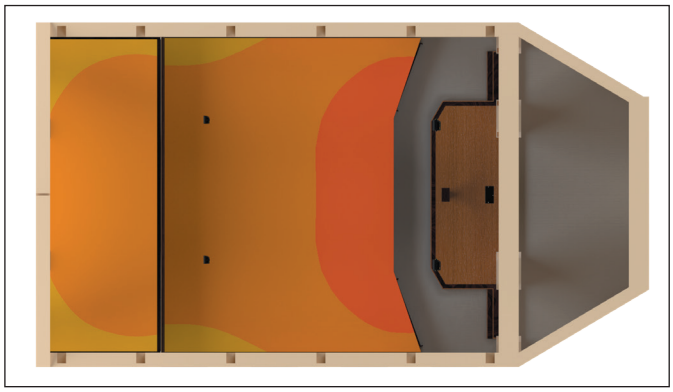
Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)



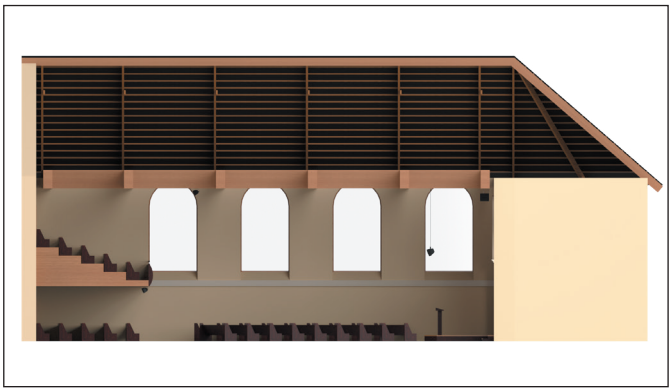
A medium sized room, where a worship band and clear speech from the pastor are the main audio sources.

In this example, a traditional distributed point source system is proposed. A pair of CDD12 loudspeakers provide the main stereo left and right sources, with CDD8 loudspeakers used to fill the areas above and beneath the balcony in mono. The CDD range benefit from Martin Audio's patented coaxial differential dispersion drive units which offer class leading sound quality and coverage characteristics. With a wide dispersion in the horizontal plane in the near field narrowing as we move up the vertical axis of the loudspeaker, CDD presents an almost rectangular coverage pattern.

In the main system this aids the in the creation of a fantastic stereo image all the way up to the front rows whilst projecting to the back. In the delay locations the rectangular coverage patten permits relatively fewer loudspeaker positions to cover a large area whilst minimising the overlap of their signals. As with the previous small space, the loudspeakers at the rear of the room are delayed allowing a single coherent wavefront to pass through the venue to all members of the congregation. A single SX212 subwoofer has been deployed for low frequency extension, and to give further impact to the worship band. If higher sound pressure levels are required, this room could be equipped with a constant curvature array such as TORUS and paired with SXCF118 flown cardioid subwoofers.

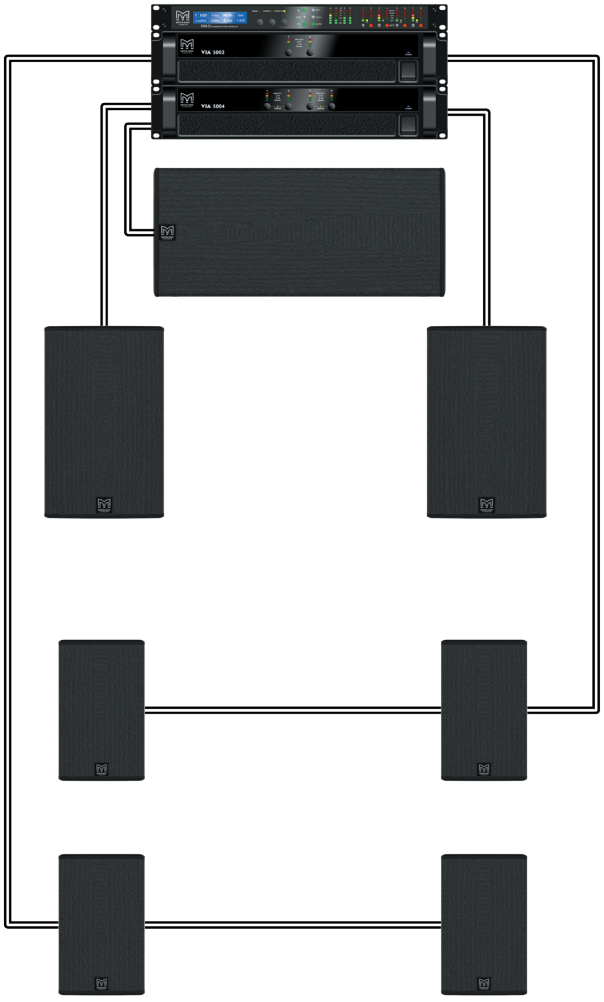


Plan View



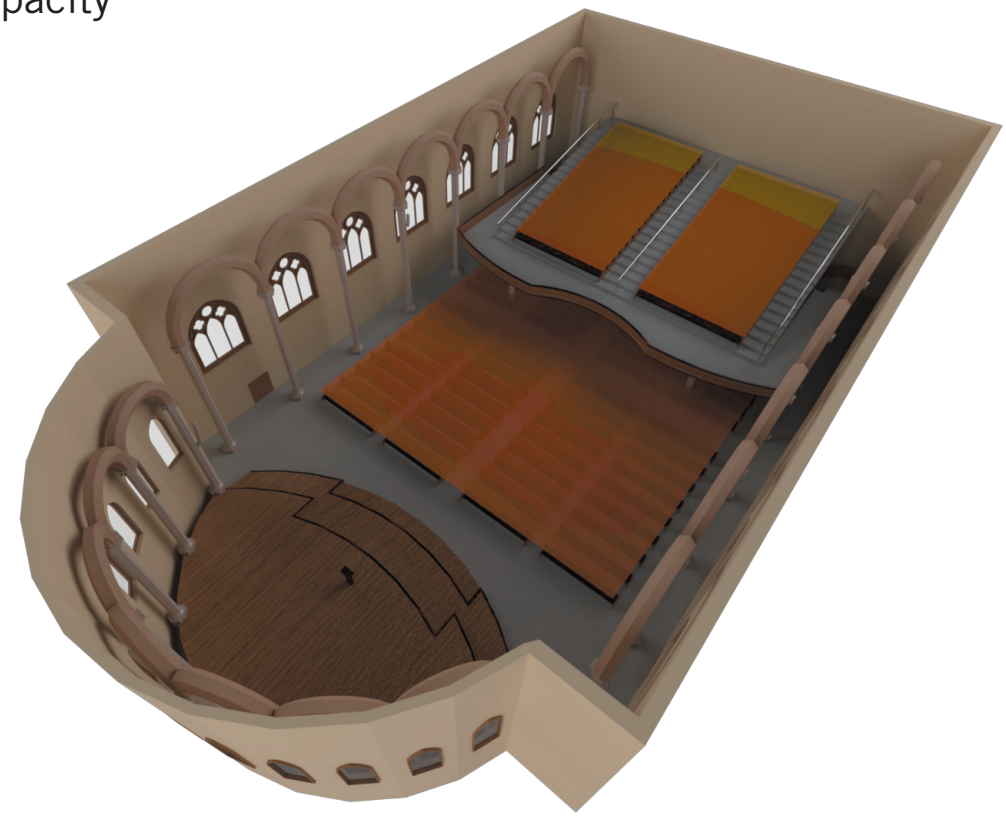
Side View

Wiring Schematic



Medium to Large Traditional House of Worship

1,500 Capacity



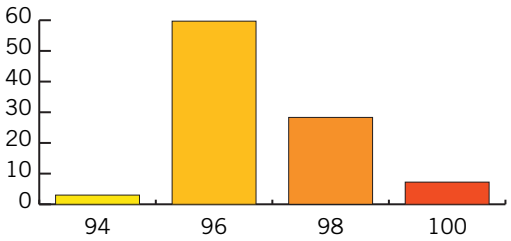
Requirements
- Speech
- Average SPL of 96dB

Loudspeakers in system
- O-Line micro line array (16 packs of 4)

Accessories
- O-Line fly and tie kit – ASF20023
- O-Line wall mount kit – ASF20022

Amplification and DSP options
- DX4.0 and VIA2004
- iK81

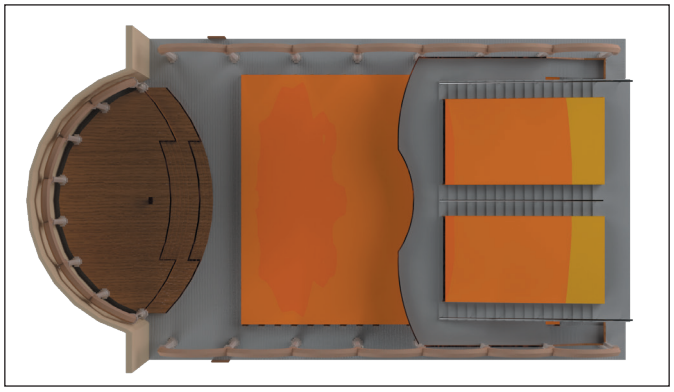
Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)



This beautiful building requires a sound system which can deliver clear, intelligible speech in a difficult acoustic environment with minimal aesthetic impact. Martin Audio's O-Line system excels in all these fields. It is a clever and unique miniature line array system which also benefits from our scalable optimisation technology. In this example, they almost disappear into this space.

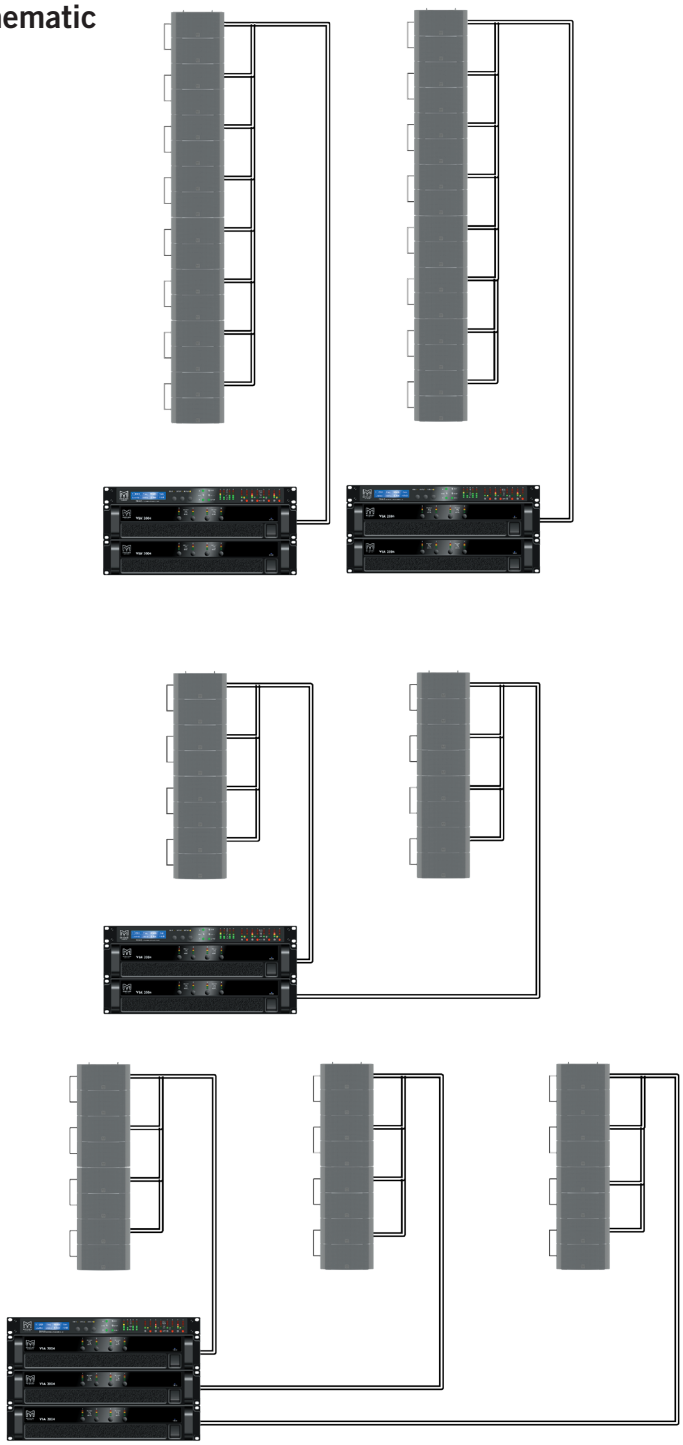
An array of 12 O-Line cabinets is deployed either side of the stage. These arrays are used to cover the floor area and as far as possible under the balcony as the line of sight allows. Where direct sound cannot be received by the congregation under the second level three additional O-Line arrays made up of 8 cabinets are deployed. The upper raked seating is covered again by a pair of eight cabinet O-Line systems.

Martin Audio's scalable optimisation technology allows O-Line arrays to make use of as much or as little digital signal processing as required to suit every venues acoustic and budgetary requirements. Higher resolution systems can expect the benefits of an extremely even frequency response, a tailored approach to SPL gradients and a higher direct to reverberant ratio by actively avoiding the stage or other surfaces with our Hard Avoid® technology.



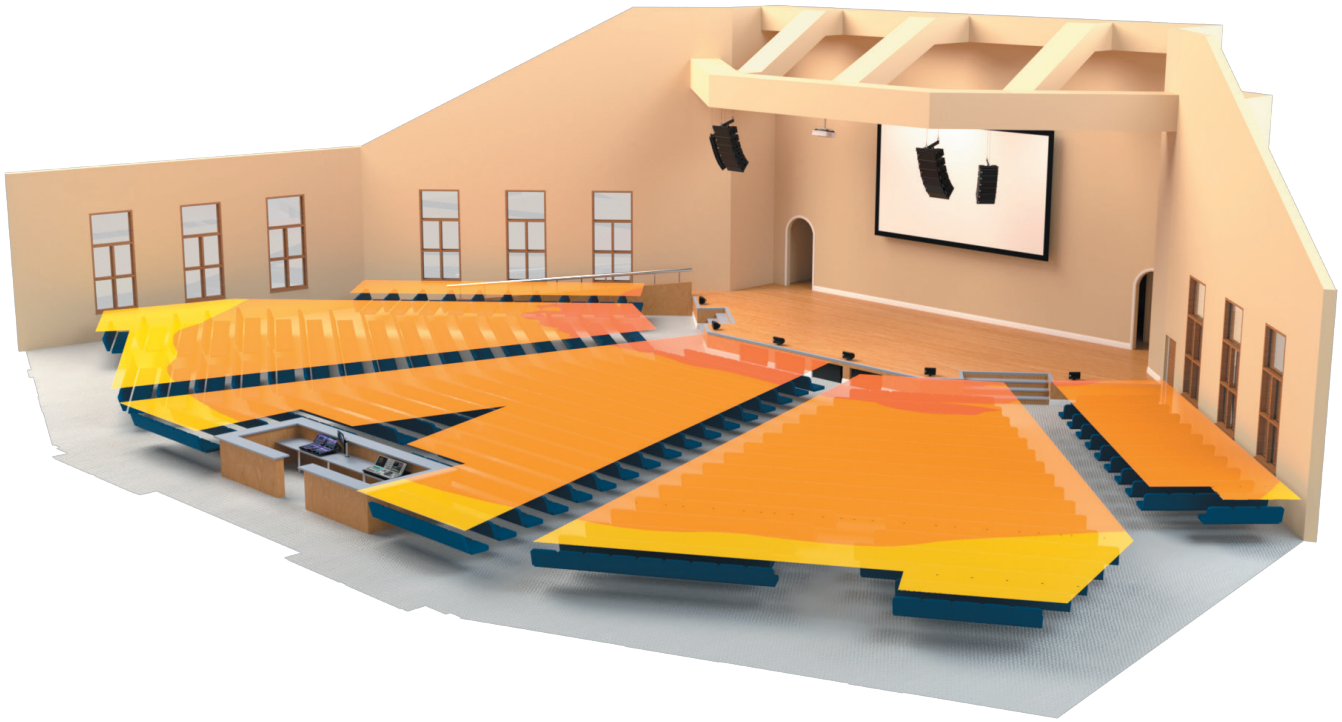
Plan View

Wiring Schematic



Medium-Sized Contemporary Worship Space

700 Capacity



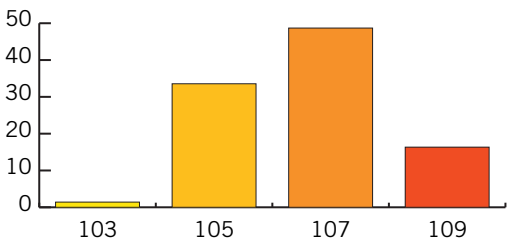
Requirements
- Full bandwidth audio production
- Average SPL of 106dB

Loudspeakers in system
- WPS – 2 x 6 arrays
- WPM – 2 x 6 arrays
- SX218 x 4
- CDD6 x 6

Accessories
- WPSGRIDi
- WPMGRIDi

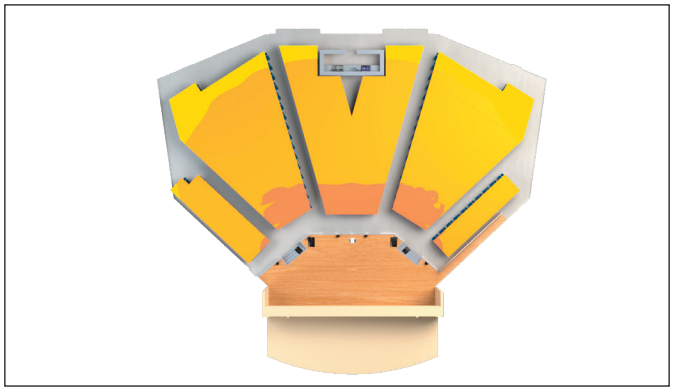
Amplification and DSP options
- iK81
- iK42

Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)



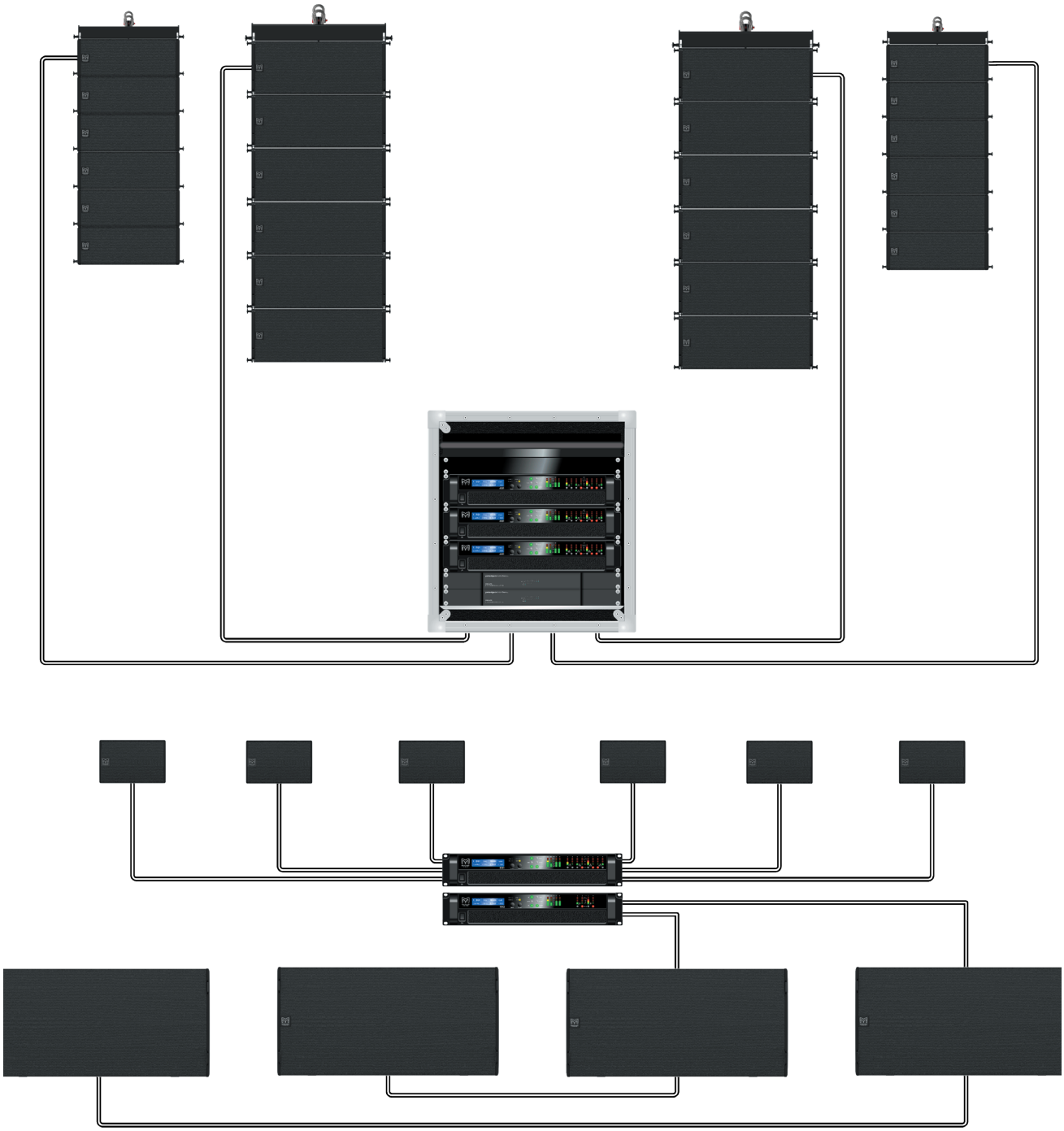
Many modern worship venues are built around this venue shape, the idea being to keep the worship leaders as much within the congregation as possible rather than remote on a stage at one end. High quality stereo music reproduction at a relatively high level from the worship band and playback, clear and impactful words from the celebrants are the key requirements.

This space is too wide for a pair of arrays to cover alone whilst maintaining any form of stereo image. The main WPS systems are there for accompanied by an additional pair of WPM arrays used as out-fills. This allows the majority of the audience area to receive a stereo signal whilst ensuring coverage to the extreme wings. Coverage throughout the space is excellent and this system design coupled with our optimisation technology maintains an even frequency response and controlled SPL profile throughout. Martin Audio's unique array optimisation technology not only ensures fantastic coverage but also allows the user to actively avoid problematic surfaces. This reduces the likelihood of feedback and improves the stage environment for those leading the worship. Front fill loudspeakers are also proposed along the front edge of the stage. These loudspeakers bring the audio focus down to stage level for those sitting at the front of the congregation creating a more natural listening environment. Subwoofers for this system are mounted beneath the stage and time aligned for a maximum coherence and impact in the audience area.



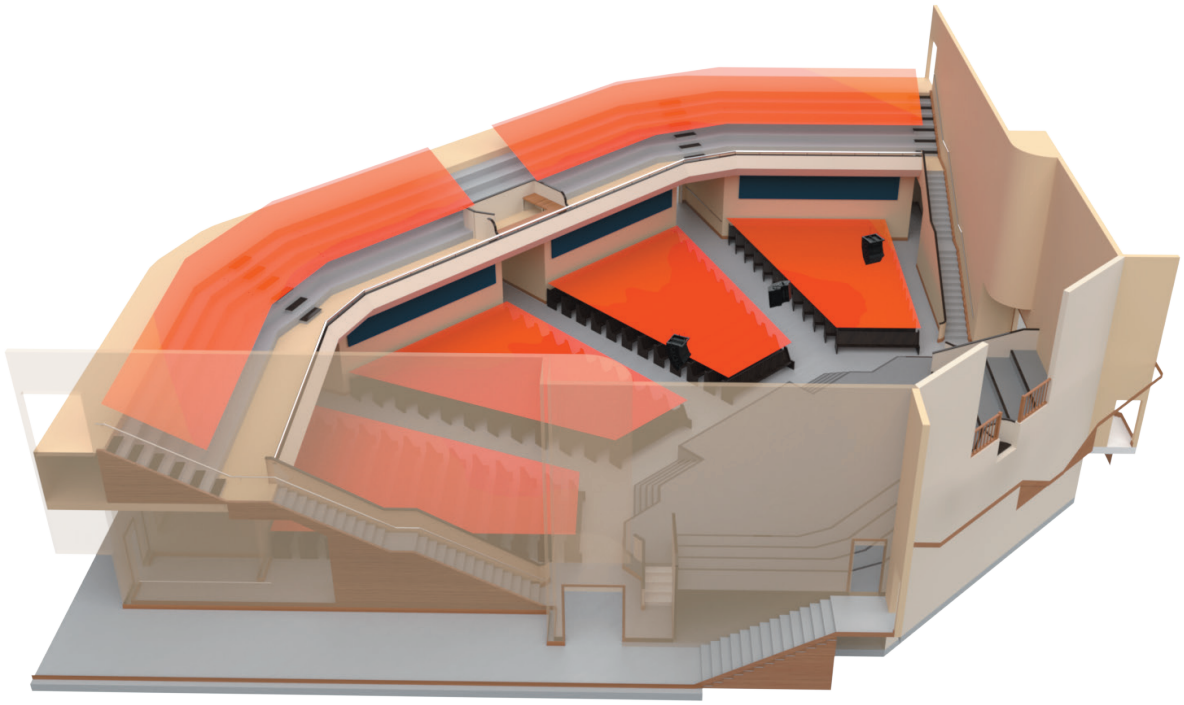
Plan View

Wiring Schematic



Wide Diamond LCR Contemporary

2,000 Capacity



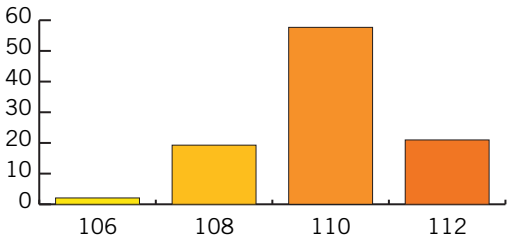
Requirements
- Full bandwidth, high SPL audio production in a true Left Centre Right configuration
- Average SPL of 110dB

Loudspeakers in system
- 2 x 2 x TORUS T1215 + T1230 Vertical
- 1 x 4 x TORUS T1230 Horizontal deployments
- 4 x SXC118

Accessories
- 4 x T12GRID
- 2 x T12HRIG

Amplification and DSP options
- iK81
- iK42

Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)

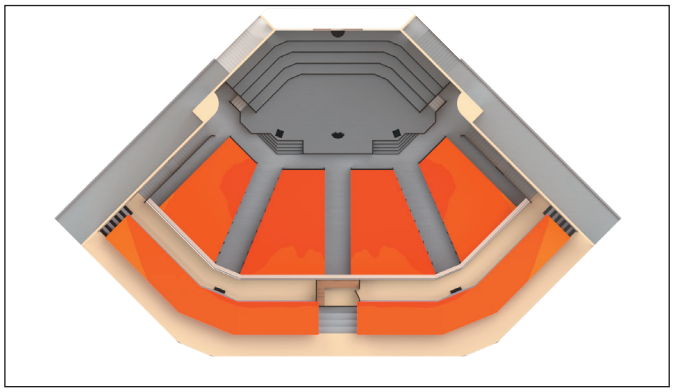


In this example we have an increasingly common 'corner stage' or 'diamond shaped 'contemporary worship space, designed to allow a greater proportion of the congregation to attend within the front rows. Spaces of this nature often demand a system capable of both horizontal and vertical coverage. Such a space is ideal for Martin Audio's TORUS constant curvature array.

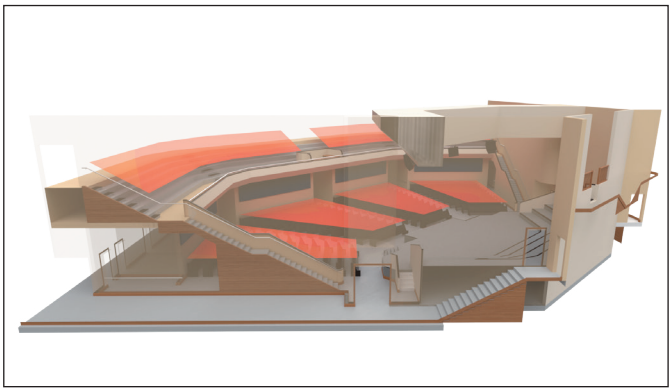
In this solution a Left – Centre – Right system is deployed ensuring all members of the congregation receive intelligible and engaging coverage. A central horizonal hang is mechanically tailored to suit the audience geometry both in the vertical axis using the dynamic horn flare and in the horizontal by selecting cabinet quantity and type. Electronic optimisation from DISPLAY 3 can then further still define our coverage criteria ensuring an even frequency response as we move from Left to right.

The left and right vertical TORUS hangs also benefit from this versatility – as well as the scale resolution seen in the Wavefront Precision series, making this system both premium in quality and a cost-effective solution.

Four SXC118 subwoofers provide low frequency reinforcement to this system and ensure a powerful bass response across the audience whilst maintain low LF levels on stage.

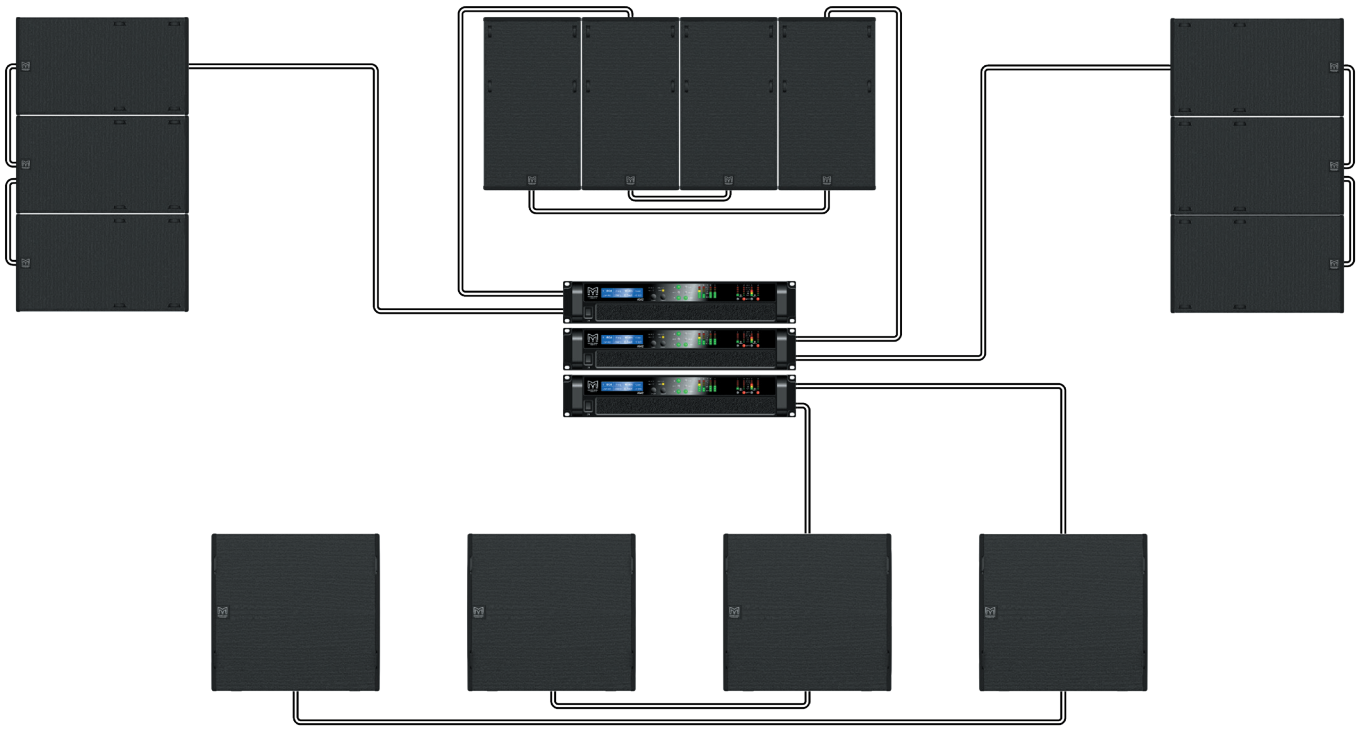


Plan View



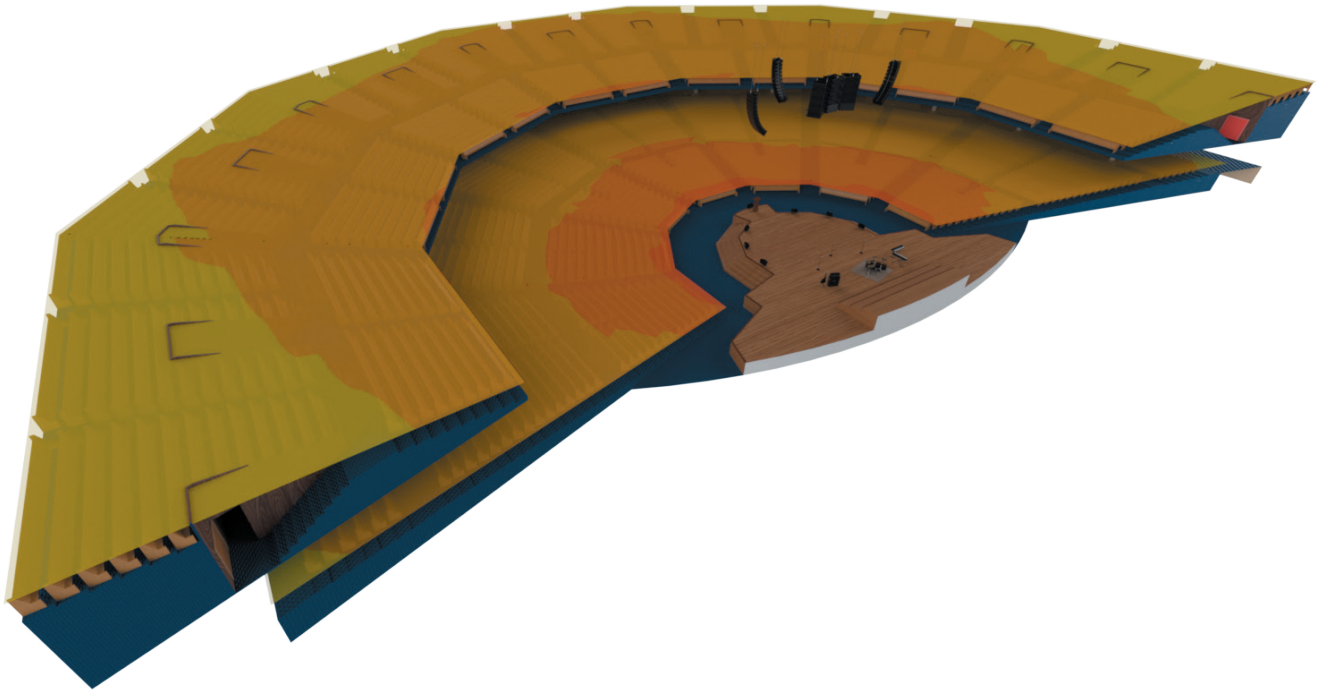
Side View

Wiring Schematic



Large Contemporary House of Worship

10,000 Capacity



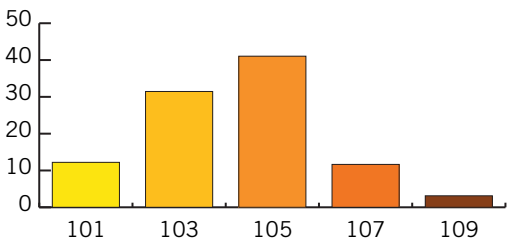
Requirements
- Full bandwidth, high SPL audio production
- Average SPL of 105dB

Loudspeakers in system
- 3 x 12 WPC
- 7 x CDD12 Front fill
- 12 x CDD12 under balcony delay
- 12 x SXHF218

Accessories
- 3 x WPCGRIDi
- 3 x WPLGRIDt
- CDDYA12B-WR

Amplification and DSP options
- iK81
- iK42

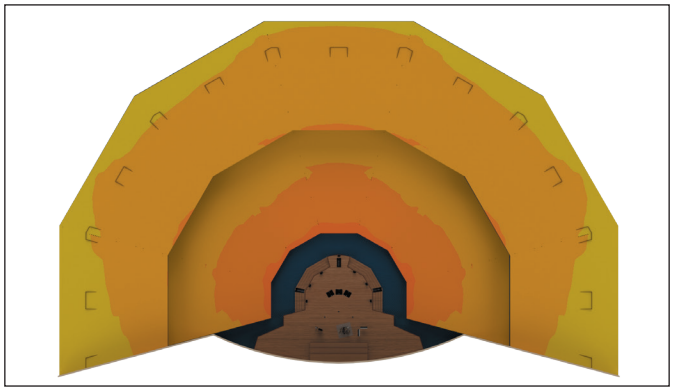
Direct SPL dBZ Distribution % Across Audience Areas (100Hz to 16kHz)



This is a large, seated auditorium with a full band, choir and spoken word all of which needs to be heard with impact and intelligibility by the congregation.

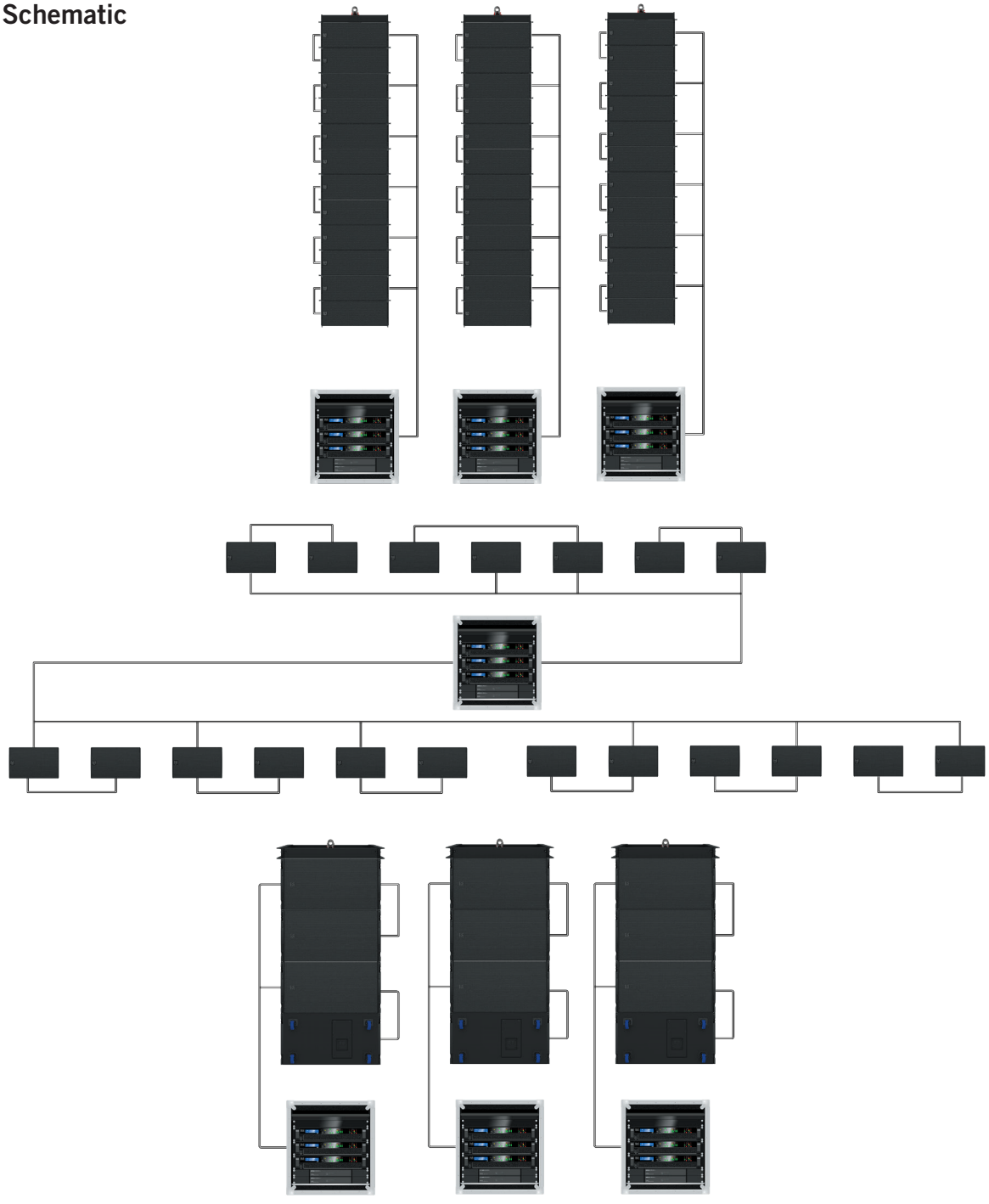
For the congregation below any balconies separate coverage must be provided where there is no clear line of site to the main loudspeakers. The example room layout does not lend itself to stereo reproduction, as most listeners are not in a suitable location for a realistic image to be conveyed. Special care must also be taken with low frequency system design as we want to minimise level on the stage whilst providing impactful and deep low frequency for the entire auditorium.

Vertical loudspeaker arrays are the obvious choice, and here three hangs of 12 WPC, powered by iKON amplifiers are proposed. In this design our optimised DSP sets will aid in high uniform SPL cross the audience areas and reduce the leakage on stage. Even reflective balcony fronts can be actively avoided to increase the direct to reverberant ratio. This system along with its flown SXHF218 cardioid subwoofer arrays will improve gain before feedback and sound quality for those on the stage. The performers can therefore operate at a lower, more controlled, level further improving the FOH experience for the congregation. Front fill loudspeakers around the stage edge are used to provide an audible focus to the stage for those seated in the front rows.



Plan View

Wiring Schematic



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