



sound**x**R

A Guide to Immersive Sound

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Thinking. Inside the box.

NEXO

A
Yamaha
Group
Company

What is Immersive Sound?

Immersive sound gives the listener the experience of 'being there through sound'. Its goal may be to create a sound experience that's as close as possible to the real world, or that augments the real world, and can only be experienced in the virtual space.

So, an immersive sound environment can be either hyper-realistic, or hyper-unrealistic.

Immersive sound empowers creatives with new avenues of artistic expression, and venues and event designers with valuable new revenue opportunities.

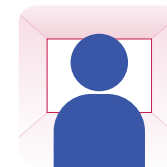
And What Makes a Listener Feel Immersed?



Accurate sound image localisation makes listeners feel that the sound source is truly 'there'.



With 3D sound localisation and reverberation, listeners feel enveloped in sound.

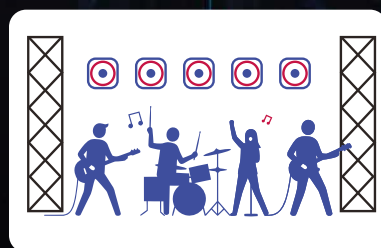


Lateral reverberation and a wide sound image give a sense of spatial width and depth.



Top speakers provide a vertical localisation of sound images.

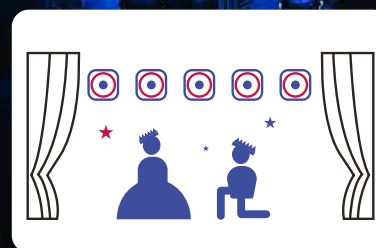
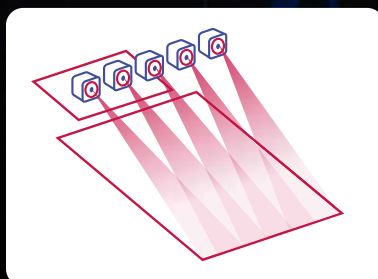
What are the Three Types of Immersive Sound System?



1

Front-of-House 180°

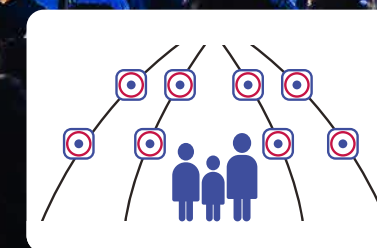
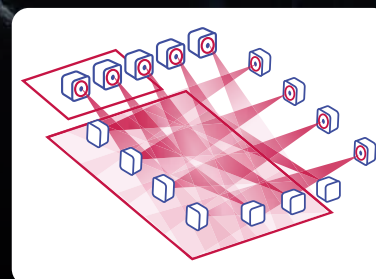
The direction of direct and amplified sound is matched in live music applications, with audience members experiencing a better separation of instruments and an optimal stereo image, even if their seat is not at the centre of the venue.



2

Stage-centric 360°

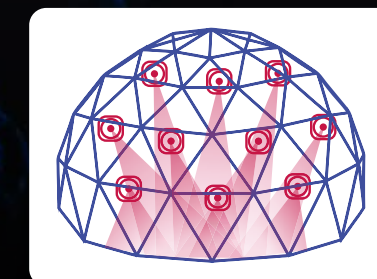
The addition of side and rear speakers for drama and musical productions enables sound designers to place content and effects around the audience, while the direction of the amplified sound can track the performers on the stage.



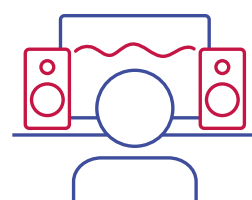
3

Non-directional 360°

The addition of top speakers means that visitors to media art, projection mapping and themed experiences can be immersed totally in a truly 3-Dimensional soundscape that enhances the impact and perceived reality of the visual content.

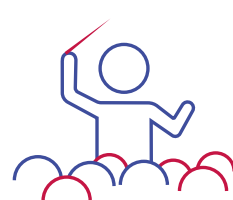


And What Can They Do For Me?



Creatives

The pipeline of immersive venues is growing, and with it the demand for content that works natively within those spaces. Producing in Sound xR positions composers and sound designers ahead of that curve, building the format fluency and creative catalogue that the next generation of productions will be looking for.



Concerts

Suddenly every seat is the best seat in the house as concert audiences enjoy the optimal stereo image even if they're not seated in the centre of the venue, while better separation of instruments and voices create deeper emotional impact and a more memorable concert experience.



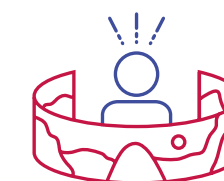
Theatres

With an immersive sound system installed, theatres are equipped to stage the growing number of productions using spatial sound and performer tracking to put the audience at the heart of the drama, drawing them deeper into the story and inviting them to engage with the action on a whole new level.



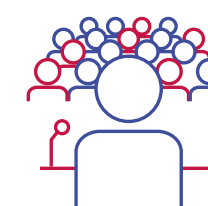
Attractions

The best themed attractions transport their visitors from everyday life to new and exciting places and scenarios. Immersive sound is key to delivering truly transformative experiences, dialling up the thrills, supporting storytelling and enhancing realism while guiding visitors along their journey.



Art Installations

It's a new breed of art installation that's driving a boom in gallery visitor numbers, where immersive sound delivers the interactive, 3-dimensional soundscapes that complement and explain the work of the world's great artists in new and exciting ways.

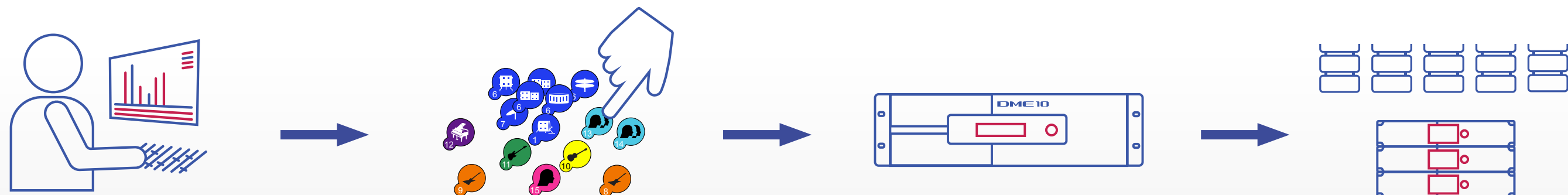


Corporates

A single screen and a lectern is no longer enough. From product launches to strategy meetings, ambitious brands already know that it's fully immersive audio-visual presentations and events that grab customer attention and create a real and lasting buzz.

The Core Components of Sound xR

Sound xR is the immersive sound solution that provides a single, seamless workflow, from content creation and live production through to processing and delivery.



Content Creation

Steinberg's Nuendo Digital Audio Workstation provides the production environment for Sound xR content, with object-based mixing tools allowing composers and engineers to build, layer and refine spatial audio from the first session, and binaural monitoring available throughout for headphone-based checking of spatial decisions.

Production Control

In live settings, the 3-Dimensional positioning of up to 128 sound objects can be controlled from the touch screen of Yamaha's industry-standard RIVAGE PM Digital Mixing Consoles (Firmware V7.0). Immersive object positioning can be set up offline and stored and recalled in console Scenes.

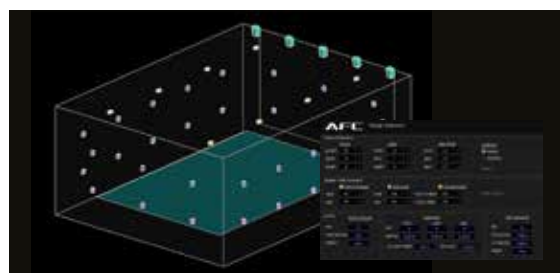
Processing

With superior musical expression and sound field design, NEXO's DME10 is the largest of a range of Sound xR immersive audio processors, taking up to 128 sound object locations from the mixing console and rendering them for output in a 3-Dimensional system configuration comprising up to 64 speakers.

Delivery

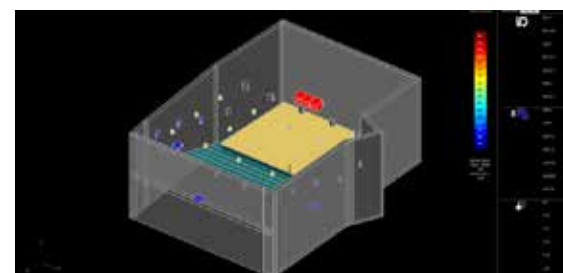
From small, powered speakers through to large format line array systems, the Yamaha and NEXO catalogues combine to offer a huge range of loudspeaker solutions, helping to ensure that the scale and budget of every application can be appropriately matched.

And the Tools That Make a Sound xR System Easy to Design and Configure



Sound xR Design Assistant

Immersive audio requires very precise speaker implementation to achieve its goal. When the user specifies parameters such as venue dimensions, stage dimensions and aisle width, Sound xR Design Assistant provides the necessary guidelines for the required number and placement of speakers to provide a full immersive audio experience for an entire audience.



NS-1 System Simulation

Sound xR Design Assistant is part of NS-1, an intuitive drag-and-drop software tool for system configuration and performance prediction. Thanks to intuitive yet powerful tools applied to your own venue geometry, NS-1 not only assists in achieving optimum sound quality, but also certifies that integration constraints are satisfied.



Exporting Speaker Positions

When the system design is complete, the design file can be transferred from NS-1 to Sound xR Image Controller, making the whole process from studio design through to venue performance as quick, easy and accurate as possible.

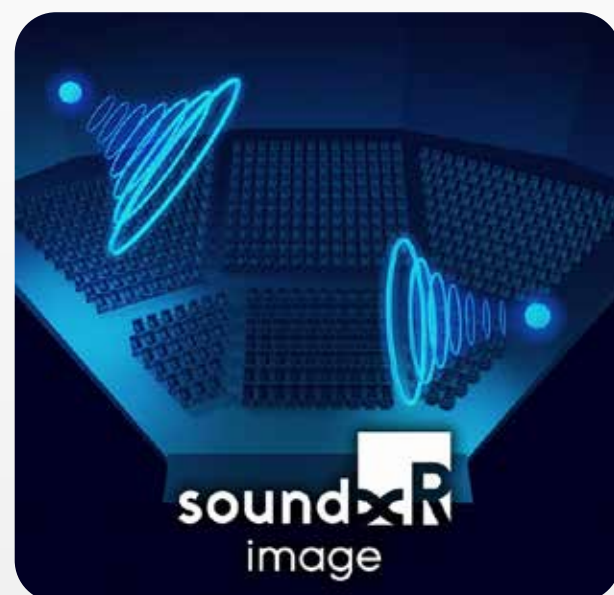


ProVisionaire

Along with sophisticated system design tools, easy online access to license management makes it straightforward for Sound xR users to get just the right amount of processing power required for their project, and for just the right amount of time.

What Makes Sound xR Different?

Sound xR encompasses three integrated immersive sound solutions in one.



Sound xR Image is an object-based sound image control system that precisely controls the location and direction of sound images within a space to deliver immersive audio experiences across a wide range of applications.

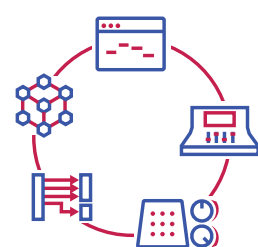


Sound xR Enhance is a sound field control system that enriches and optimises the resonance of sound by utilising the unique acoustic characteristics inherent to a building's space, preserving the natural sound of instruments and vocals while controlling the reverberation and perceived volume of sound within the space, providing an acoustic environment suited to its purpose.



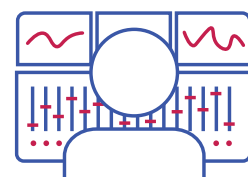
Sound xR Core is a virtual spatial audio processing engine for earphones/headphones. Within the application domain of xReality – a collective term for VR/AR/MR/SR – it enables interactive, high-fidelity sound localisation and soundscape design.

And What Makes Sound xR Easy and Cost-Effective to Use?



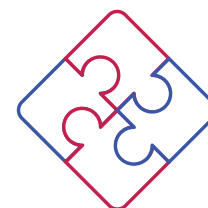
One seamless workflow

Building immersive audio involves extensive software work, from meticulous content creation to speaker acoustic simulation. Sound xR reduces this workload at every step, providing a seamless workflow that allows sound creators and engineers to focus on crafting the desired content and acoustic space without being burdened by technical tasks.



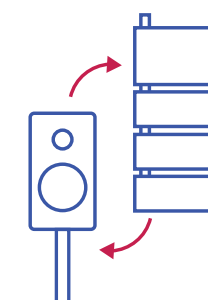
Easy to deploy and operate

Sound xR encompasses a suite of intuitive software tools to design and configure immersive audio systems for any given event or venue, and similarly intuitive production tools and processes to ensure the successful, dependable and repeatable delivery of spatial audio content across a range of applications.



Open and compatible

Sound xR Image integrates with a variety of DAWs, show controllers, tracking systems and other devices via the OSC or ADM-OSC protocol. This enables compatibility with a wide range of content, and control and monitoring of Sound xR Image parameters from external tools.

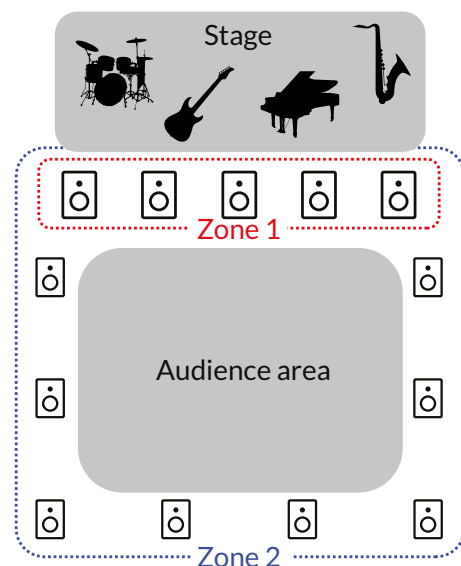


A scalable solution

A comprehensive choice of hardware components encompassing mixers, processors, amplifiers and speakers mean that Sound xR systems can be configured to match precisely the scale of every project, and flexible online license management ensures that only the appropriate level of immersive audio processing power is purchased.

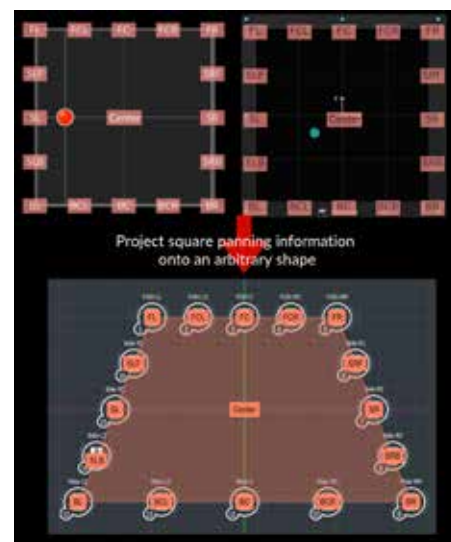
A Deeper Dive for the Technical Team

The Unique Features of Sound xR Image



Speaker Zone

- A speaker zone refers to a group of speakers, and each sound object is assigned to be rendered through a specific speaker zone
- It contributes to avoiding unintended sound localisation and to achieve sharp localisation of sound images
- NB: one object can only be assigned to one speaker zone

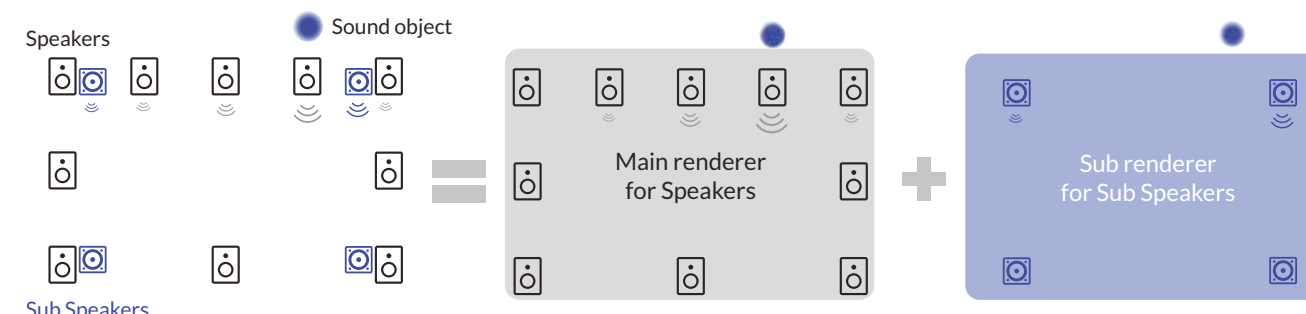
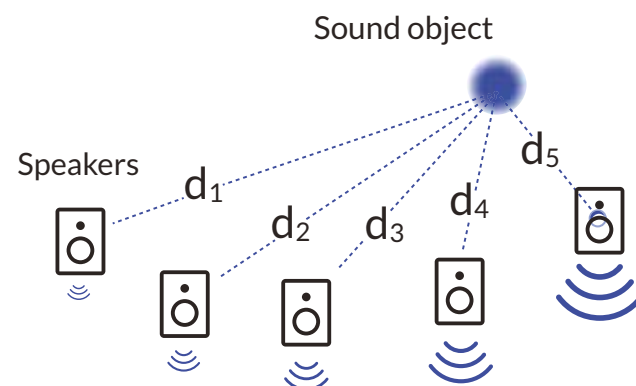


Rendering Area Conversion

- The rendering area defines how the cubic panning data is converted into Cartesian coordinates
- It contributes accurate sound localization and sound image movement even in non-rectangular spaces
- It minimises remixing work from studio to live venue or a venue to another venue (direct scalability from one venue to the next)

Sound xR Image's Rendering Method of Object-Based Audio

- There are several rendering methods of Object-based Audio: VBAP, DBAP, WFS, of Object-based Audio: VBAP, DBAP, WFS, ...
- Sound xR Image derives from the DBAP (Distance Based Amplitude Panning) method that determines the output level of each speaker based on the position of sound objects and their distance to each speaker, independently from listener position
- It performs sound localisation processing without applying delay



Sub Renderer Function

- Sub renderer function simultaneously renders a single sound object for two speaker zones
- It can be used to support low-frequency sound localisation and movement, but also used for front fill speakers, bass management or stage monitoring, determining objects and their distance to each speaker, independently from listener position
- It performs sound localisation processing without applying delay processing

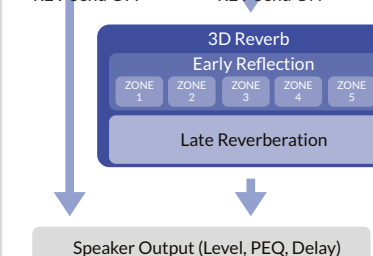


High Quality 3-Dimensional Reverb Effect

- A custom-designed spatial reverb developed exclusively for Sound xR Image
- Based on 3-D impulse responses from real venues
- It dynamically adapts its processing based on the sound object's position and the actual speaker layout
- Over 100 dB of dynamic range, delivering rich and natural spatial impressions with high-resolution sound quality

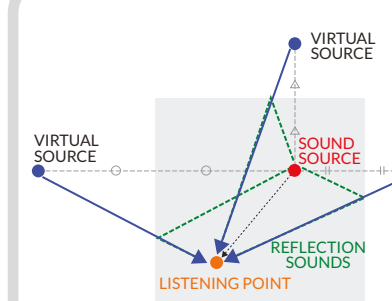
Object-Based Audio rendering

REV Send OFF REV Send ON



Inside the 3D Reverb Algorithm

- 3D Reverb separates processing into two parts: Early Reflections (ER) and Late Reverberation (REV)
- ER processing is based on the sound object position, mixed down into five spatial zones, and individual processing signals are sent to each speaker
- REV processing remains consistent regardless of object position, but different signals are sent based on speaker locations



Inside the 3D Reverb Algorithm for ER

- ER processing utilises the concept of Virtual Source Distribution which is 3D data of reflection sounds.
- This is a method for replacing sound reflections from room surfaces with sound propagation from virtual sound sources located outside the space

Who is Sound xR?

Yamaha has been revolutionising spatial audio with Active Field Control (AFC) for decades, with countless successful implementations at events and venues around the world.

Now AFC becomes Sound xR, as Yamaha comes together with other companies in its group in a collective mission to simplify, streamline and democratise immersive audio technology: Immersive Experiences for Everyone.

Yamaha, Steinberg and NEXO. Together, we are Sound xR.

▶ steinberg

Steinberg is a premier German musical software company based in Hamburg, globally renowned for revolutionising digital audio production. Founded in 1984, the company is the creator of the Nuendo: A widely adopted post-production and game audio tool used by sound designers, film editors, and mixing engineers.

YAMAHA *Make Waves*

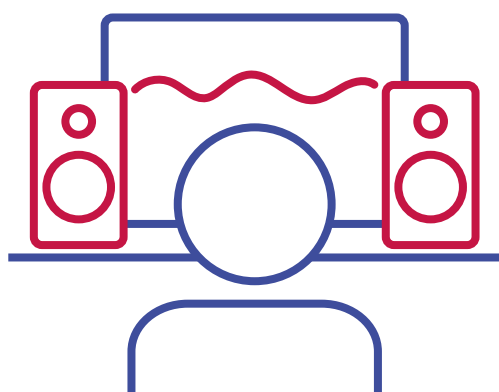
Yamaha was established more than 130 years ago, and since that time the company has led musical instrument and sound innovation, acquiring extensive know-how and refined sonic sense along the way. Yamaha continues to build on that background, delivering products and services that result in thoroughly satisfying sound and music environments.

NEXO

NEXO has been designing ground-breaking sound reinforcement loudspeaker solutions at its Parisian headquarters since 1979. The company's pioneering technology, innovative designs and sonic excellence have enhanced live events and sporting and entertainment venues across the globe for decades, gaining the respect and trust of sound professionals everywhere.

What Do I Need?

Not a complete list of the kit you'll need, but a basic overview of what's required for a Sound xR Image immersive audio application.



I'm a Creator

A Nuendo workstation provides a complete immersive production and mixing environment - object-based tools, binaural monitoring and ADM / OSC-compatible export, all within a single session. From first creative decision to final mix, the workflow is contained, portable and built around standards that speak directly to Sound xR-equipped venues.



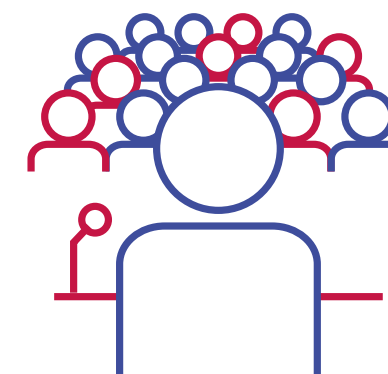
I'm a Theatre

A Sound xR-equipped Yamaha digital mixing console makes for streamlined productions, plus a Yamaha or NEXO DME processor with the necessary Sound xR Image license activated, then the appropriate installation of Yamaha - or for larger venues - NEXO loudspeakers, either across the stage only or also at intervals along the side and back walls.



I'm a Themed Attraction

Your audio content will be served from a DAW with sound objects rendered by a Yamaha or NEXO DME processor and routed to zoned loudspeakers, delivering appropriate audio content at various points in your themed attraction.



I'm a Corporate Auditorium

A much smaller installation of just 16 speakers with a single Sound xR immersive processing license on a DME processor is all it takes to transform the audio component of AV presentations, grabbing the attention and engagement of everyone in the room and ensuring that they hear everything clearly.

And How Can I Find Out More?



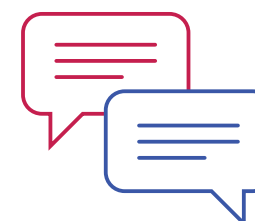
Visit the Sound xR Website

Take a deeper dive into Sound xR at nexosoundxr.com



Visit a Sound xR Immersive Demo Hub

Sound xR immersive sound systems can be experienced at demo hubs around the world. Find your nearest at nexosoundxr.com



Tell us about your project

You can send an email to soundxr@nexo.fr



Request a call

Put your number in the email along with a convenient time to call and we'll get back to you.

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