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# Theatres

**A guide to creating a design specification for the  
upgrade of audio-visual systems for theatres.**



## A guide to creating a design specification for the upgrade of audio-visual systems for theatres.

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At Audiotek, we pride ourselves on having over 40 years of experience in audio and lighting system design. We've had the privilege of working on some of the world's most prestigious venues, delivering exceptional audio and visual experiences through meticulous design and innovative technology.

The purpose of this ebook is to guide you in developing a detailed specification for upgrading your theatre or concert hall's audio and lighting systems. Drawing on our extensive expertise and with some real-world examples, we've designed this resource to provide you with the insights and knowledge necessary to achieve a successful upgrade that meets your venue's unique requirements.

By understanding the requirements of diverse types of venues and the specific needs of various performances, you will be equipped to create precise and comprehensive specifications. This, in turn, will enable third-party audio-visual system engineers to provide accurate quotations and ensure the successful implementation of your upgrade project.

Join us as we explore the intricacies of audio and lighting system design, drawing from our rich history and innovative projects to help you transform your venue into a state-of-the-art performance space.

# Designing Audio and Lighting Systems for Theatres and Concert Halls

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## Understanding the Requirements

Before diving into technical specifications, it is essential to understand the specific requirements of your venue. Factors to consider include:

**Venue Size and Layout:** The physical dimensions and layout of the theatre or concert hall significantly impact the design of audio and lighting systems. Consider seating capacity, stage dimensions, and architectural features.

**Types of Events:** Identify the types of performances and events your venue hosts, such as theatrical productions, concerts, conferences, and multimedia presentations. Different events have varying audio and lighting needs.

**Acoustic Properties:** Assess the venue's acoustic characteristics, including reverberation time, sound reflection, and absorption. Acoustic treatment might be necessary to optimize sound quality.

**Existing Infrastructure:** Evaluate the current audio and lighting infrastructure to identify components that can be retained, upgraded, or replaced.

### Sound Reinforcement

Sound reinforcement is crucial for ensuring that audio is evenly distributed throughout the venue. Key components include:

**Main PA System:** Specify the type and number of main speakers required. Line array systems are often preferred for larger venues due to their ability to provide even coverage.

**Subwoofers:** Determine the need for subwoofers to enhance low-frequency performance, particularly for music events.

**Fill Speakers:** Include front-fill, side-fill, and delay speakers to cover areas not reached by the main PA system.

### Microphone Systems

**Wired and Wireless Microphones:** Specify the number and types of microphones needed, including handheld, lavalier, and headset microphones. Wireless systems should be chosen based on the venue's RF environment.

**Microphone Placement:** Provide details on microphone placement for optimal sound capture, considering stage layout and performance type.

### Mixing Consoles

**Digital Mixing Consoles:** Recommend digital consoles for their flexibility, recallability, and integration with other digital systems.

**Channel Count:** Specify the required number of input and output channels, considering current and future needs.

### Signal Processing

**Digital Signal Processors (DSPs):** Specify DSPs for tasks such as equalization, compression, and delay management.

**Network Audio Protocols:** Consider using network audio protocols like Dante or AVB for scalable and flexible audio distribution.

### Monitoring Systems

**Stage Monitors:** Specify the number and types of stage monitors required, including wedge monitors and in-ear monitoring systems.

**Monitor Mixing:** Detail the monitor mixing console requirements, separate from the front-of-house console if necessary

### Stage Lighting

Stage lighting enhances the visual impact of performances. Key components include:

**Fixture Types:** Specify a mix of fixture types, including spotlights, wash lights, and LED fixtures for versatility.

**Control Systems:** Recommend lighting control consoles capable of handling complex lighting cues and effects.

**Dimming Systems:** Include dimming systems for smooth intensity control of conventional lighting fixtures.

### Architectural and Ambient Lighting

**House Lights:** Ensure the house lighting system is flexible, allowing for various levels of audience illumination.

**Emergency Lighting:** Comply with safety regulations by incorporating emergency lighting systems that activate during power outages.

### Special Effects

**Moving Lights:** Consider moving lights for dynamic and programmable lighting effects.

**Gobos and Colour Changers:** Include specifications for gobo projectors and colour changers to add texture and colour to the lighting design.

### Control Systems

**Centralized Control:** Specify a centralized control system that integrates audio, lighting, and video systems for streamlined operation.

**Touchscreen Interfaces:** Recommend touchscreen interfaces for intuitive control.

### Networking and Cabling

**Network Infrastructure:** Ensure a robust network infrastructure capable of supporting audio, lighting, and control data.

**Cable Management:** Detail cable management solutions to maintain a clean and organized setup.

## Drafting the specification document.

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When drafting the specification document for third-party audio-visual system engineers, include the following sections:

### **Introduction**

- Overview of the venue.
- Purpose of the upgrade.

### **Current System Assessment**

- Description of existing audio and lighting systems.
- Identified shortcomings and areas for improvement.

### **Technical Requirements**

- Detailed specifications for audio and lighting systems.
- Brand and model preferences, if any.

### **Design Considerations**

- Acoustic treatment recommendations.
- Power and electrical requirements.
- Integration with existing infrastructure.

### **Budget and Timeline**

- Estimated budget range for the project.
- Desired timeline for completion.

- **Evaluation Criteria**

- Criteria for evaluating proposals from system engineers.
- Emphasis on experience, quality of equipment, and support services.



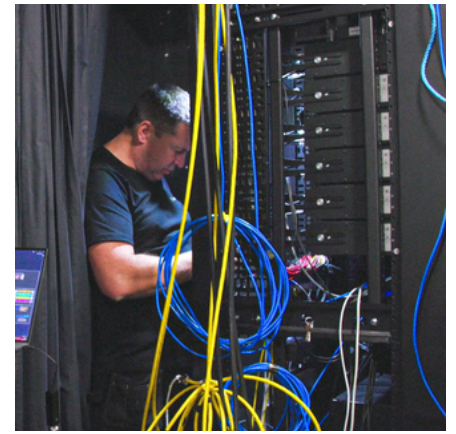
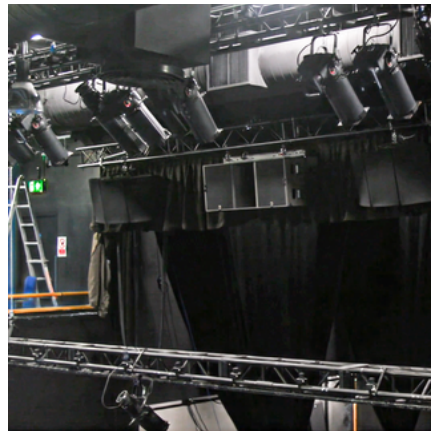
## Conclusion

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Upgrading the audio and lighting systems in a theatre or concert hall is a complex but rewarding endeavour that can significantly enhance the audience experience and the quality of performances. By understanding the specific needs of your venue and drafting a comprehensive specification document, you can ensure that third-party audio-visual system engineers provide accurate and detailed quotations, leading to a successful upgrade project. As you explore the intricacies of audio and lighting system design through our case studies, we hope you gain valuable insights that will help you transform your venue into a state-of-the-art performance space.

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# Case Studies



# Pavilion Theatre, Dublin.

## Venue

Pavilion  
Theatre

## Location

Dublin

## Product

L - Acoustics

### Where:

Pavilion Theatre first opened its doors in 1903 and has undergone many transformations throughout the years. Located in the picturesque seaside town of Dún Laoghaire (just south of Dublin), the current Pavilion Theatre was built in 2000 as a municipal theatre, with a maximum capacity of 324 seats. It has since grown and established itself as a thriving cultural centre entertaining thousands of visitors every year.

### The challenge:

Update and enhance the audio system for the benefit of audiences, performers, and crew. The system needed to seamlessly switch between a wide variety of performance types, delivering consistent sound quality to every corner of the venue.

### What we did:

System design and installation working alongside L-Acoustics.

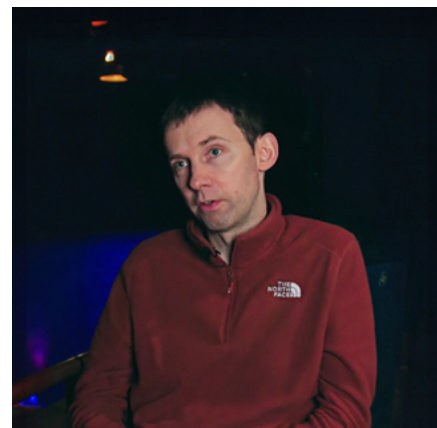
### Project overview:

Pavilion Theatre runs a packed schedule of performances including everything from spoken word to ballet, orchestra, live music and even as a cinema! As a result, the demands on the audio system are pretty intense. Accommodating (and satisfying) crew, performers and audiences is no easy task. The ability to quickly transition from one performance type to another was critical as the existing system was extremely labour-intensive and tricky to balance. Pavilion Theatre wanted to take a big step forward from their existing system.

# Pavilion Theatre, Dublin.

*"We wanted a system that is always installed so we no longer needed to spend time on stage setting up and breaking down the system every time we needed to switch out. We also needed a system that was easily configured so we could respond to the requests of production crew more effectively."*

**Ronan Fingleton, Technical Director, Pavilion Theatre.**



The ambitious scope of the project demanded a response that was equal to the ambitious goals of the Pavilion team. It required a lot of time, attention to detail and creative thinking to develop a system that lived up to the expectations of the Pavilion team.

*"We're an ambitious venue, and we needed to find a company that understood that and were able to meet and exceed our vision. Audiotek and L'Acoustics were the only companies who put the time and effort into the sort of detail that I was looking for. From the very start Audiotek were very much 'on it' as in really understanding what we wanted and then figuring out the details and logistics of actually doing it."*

**Ronan Fingleton, Technical Director, Pavilion Theatre.**



Audiotek Project Manager, Ashley Attwood, worked alongside the Pavilion team. We pulled together a top-level conceptual schematic of what a system might look like. That helped shape our understanding of what the system needs were, and what could work. When we had that nailed down, we moved onto the system design. The system needs to last, so a key aspect of design was not only what do they need today, but what would they need down the line.

## **The System:**

The main system is a left-centre-right array, flown about the Pros (as in a proscenium arch). The design keeps the bulk of the system discretely out of the way but has the coverage and power to cover the whole audience.

# Pavilion Theatre, Dublin.

Working with L-Acoustics we took 24 reference measurements across the listening area to measure the coverage. As a result, the design was reinforced around the building with various fills to ensure that coverage was reaching into the many complex nooks and crannies around the audience space. The challenge was making sure that the same high-quality sound was replicated into all those different areas and not just the main seating area. We discretely added additional delay speakers tucked away in corners which were all aligned and coherent to the main system, so everyone gets the best quality audio.

*"We want everybody in the room, whether you're in the nosebleeds or whether you're in the first row, to have the same experience. The net result is a more immersive experience for the audience ... no matter where they sit."*

**Tom Lareuf, Applications Engineer, L-Acoustics.**



*"Previously we were running analogue, but now we're running through the Dante System into the Q-Sys. It was a big step up and we were able to integrate lots of other aspects into the design, such as multi-track recording, and camera loops. It opens up a new world for us and it's a great improvement."*

*"We have eight brand new X 12 monitors on stage. A lot of bands that come nowadays, want a lot of level on stage and with the previous system, I always spent a lot of time on stage having to EQ the monitors. I only had half the time to spend on the front of house. Now to set up, I just bring up the levels on stage and then I have more time to spend on front of house."*

*"So, it's made my job nicer and actually easier to do. The main difference I've noticed is the quality and clarity of the boxes themselves. With the L'Acoustics, it's a lovely warm, almost hi-fi sound and we can create a great audio image. Having the L'Acoustics brand is a great statement for the theatre, and I think overall it's going to bring in a higher calibre of acts."*

**Ben Keighley, Senior Technician & FOH Engineer,  
Pavilion Theatre.**



# Pavilion Theatre, Dublin.

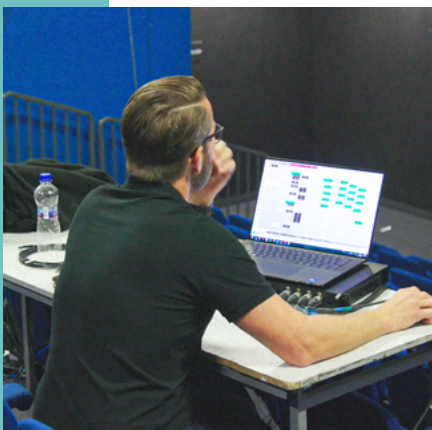
*"We're very happy with the system and we're very happy that we've been able to put it in very discreetly. There's a huge amount of PA there, but it's not something that's screaming out at you and getting in the way. And it's particularly important for theatre and dance and opera and those kinds of shows that you're not distracting from the audience's experience.*

*I think that we've achieved that and it's there when you need it, but otherwise, it just disappears into the background and I'm very happy with that."*

**Ronan Fingleton, Technical Director, Pavilion Theatre.**

## **System List:**

- LA4X CE – Amplified controller with FC 4 x 1000 W/80hms. Ethernet network. AES/EBU. CE version.
- LA12X CE – Amplified controller 4 x 2600 W/4 Ohms CE mains connector.
- A10i WIDE – 2-way passive constant curvature WST® 30° enclosure: 10" LF + 2.5" HF diaphragm (installation version).
- KS28 Flyable Subwoofer 2 x 18"
- A10i WIDE-SCREEN – acoustically transparent front screen for A10i Wide
- A10i WIDE-SCREEN-LIFT – Acoustically transparent front screen for A10i Wide with A10i-Lift
- 5XT- 2-way passive coaxial enclosure: 5" LF + 1" HF Diaphragm
- LA4X CE – Amplified controller with PDF 4 x f1000 W/8 Ohms. Ethernet network. AES/EBU. CE version.





# The Helix Theatre.

## Venue

University  
Theatre

## Location

Dublin

## Product

L Acoustics

Audiotek supplied a full L-Acoustics sound system to the main theatre space within the Helix facility on the DCU campus. The system was specified by Audiotek and the in house sound team, installed to meet the wide variety of productions put on in the space. From comedy, theatre, or music shows open to the Public and Students alike, the system needed to be flexible around the uses of the space.

The system consists of L-Acoustics ARCS FOCUS speakers, with 5XT infills, and X12 balcony fills. All stage mounted speakers are removable, with different presets to easily recall if the speakers need to be moved up/downstage to fit different productions.