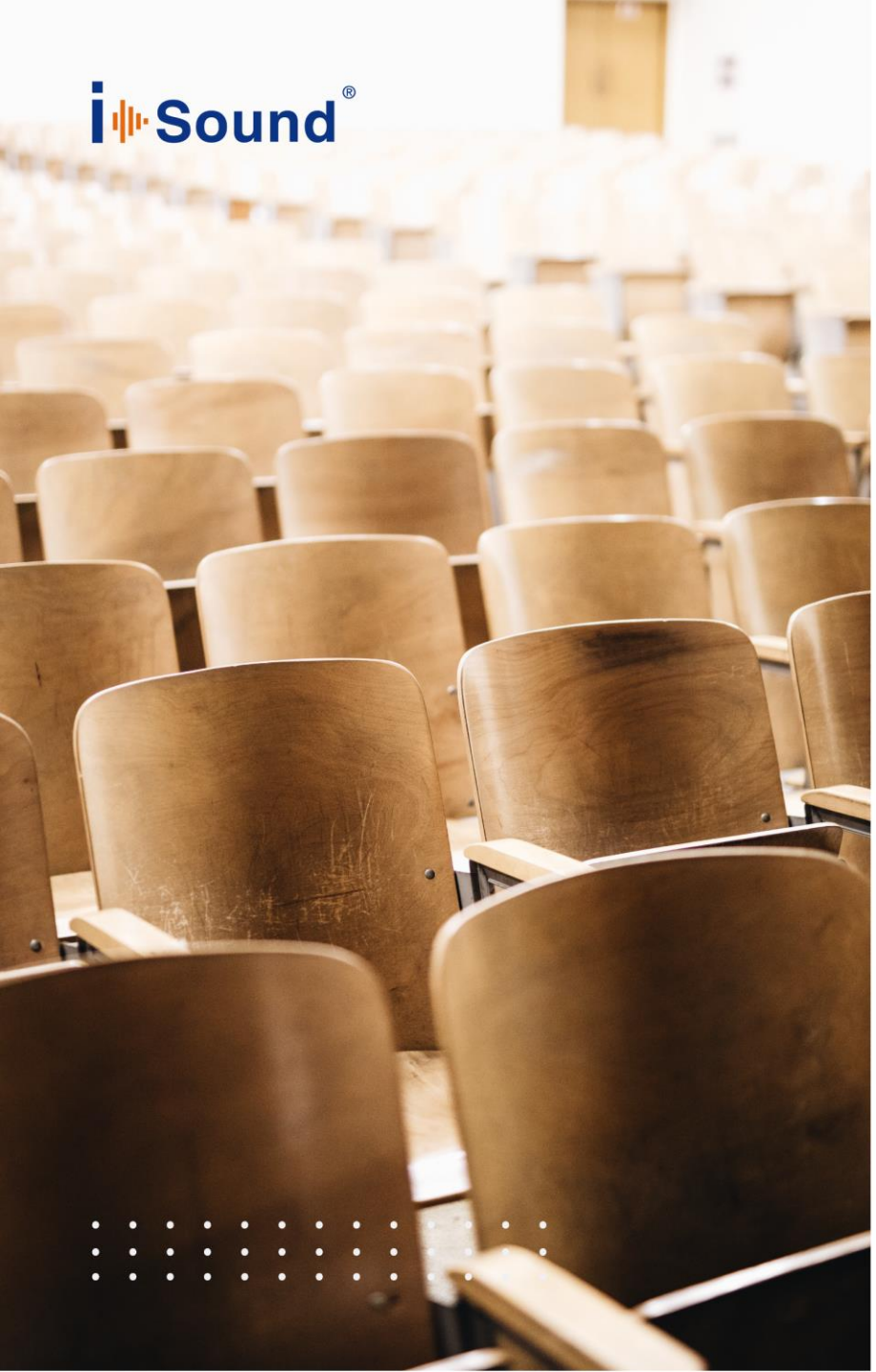
i-Sound®

PROJECT

The acoustic solution report of Middle School Reporting room

Bring Acoustic comfort to
Each space



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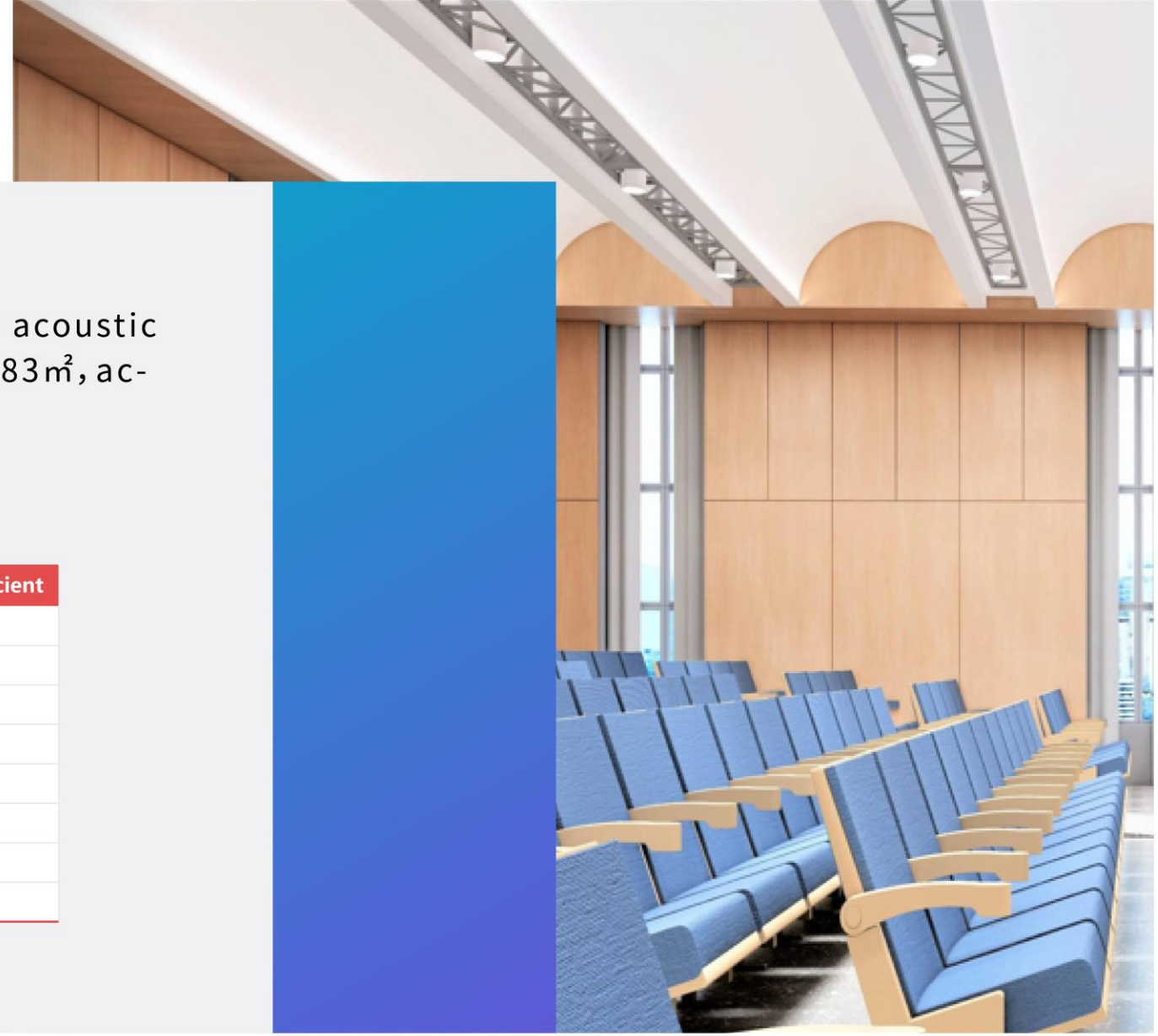
01 Space overview

Space description, Materials Application

Space overview



1、Space Description

The space which requires the architecture acoustic design, is a stepped lecture hall, area of 283㎡, accommodates 300 people.

2、Materials application

Area	Materials	Diffuse reflection coefficient
Ceiling	Aluminum Sheet	0.05
	Woodgrain Laminates	0.05
Floor	Terrazzo	0.02
	Wood floor	0.05
Wall	Woodgrain Laminates	0.05
	Wood Door	0.05
Furniture	Chairs	0.03
	Table	0.6

02 Design Scope
Design content

Design Scope
Design content

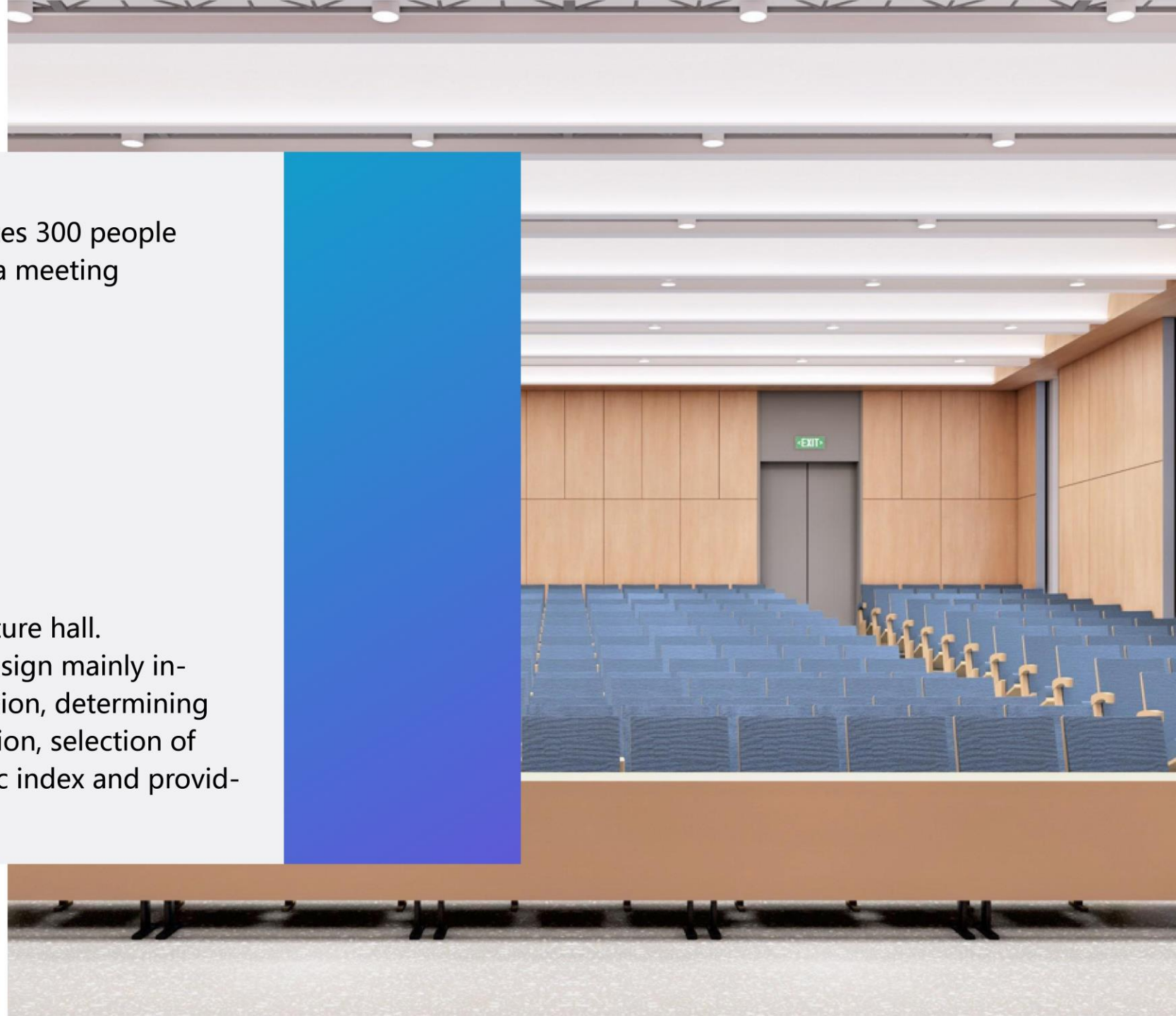
1、Design Scope

The Lecture hall area 283㎡and accommodates 300 people need to accomplish the function of holding a meeting

Area	Lecture Hall
Room Volume	About 1300m³
Total Surface area	About 2257.2㎡
Total Seat No.	Around 300 seats
Length	21.1 meter
Width	13.4meter
Height	4.6 meter

2、Design Content

The interior space acoustic design of the lecture hall.
The content of the interior space acoustic design mainly includes: cooperating with the interior decoration, determining the acoustic structure of the interior decoration, selection of acoustic materials, proposing a clear acoustic index and providing corresponding calculation books.



03 Design Reference

Space data, National Standard Requirements

Design Reference

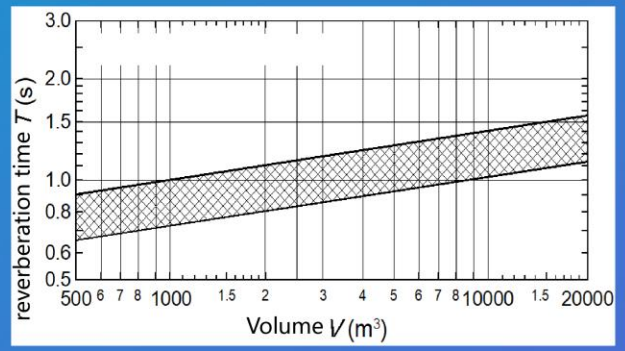
1、Space Data

The decoration implement draws of lecture hall
GB/T50356GB-2005 Specifications for architectural acoustic design of theaters, cinemas, and multi-purpose halls

Design Reference

2、National standard requirements

According to GB/T50356GB-2005 Specifications for architectural acoustic design of theaters, cinemas, and multi-purpose halls, the reverberation time standard of the lecture hall will be like blow

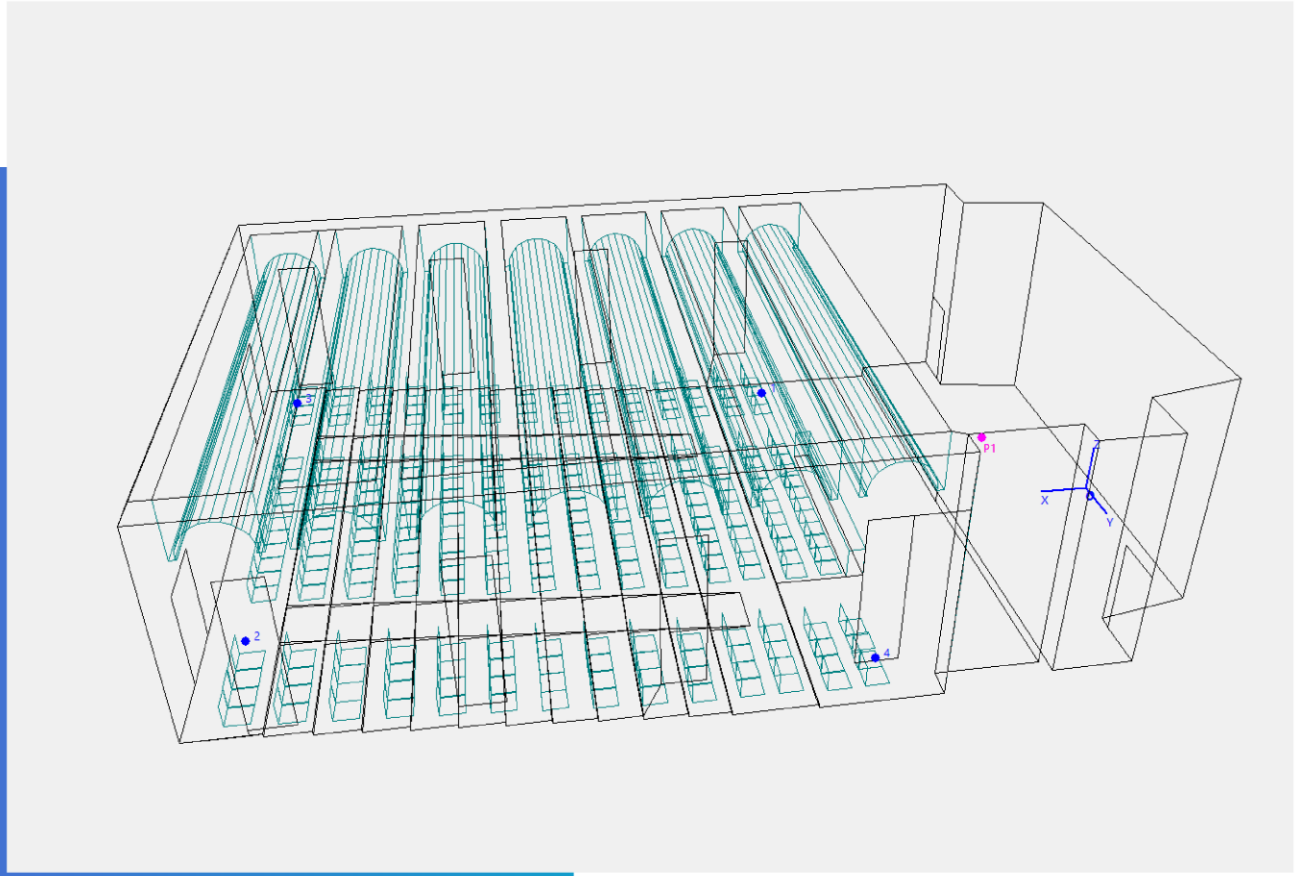


According to the above table, confirming the reverberation time for 1300m³Lecture hall should be less than 1.2s, to achieve a good sound effect.

04 Simulation Analysis

Space Modeling

Simulation Analysis



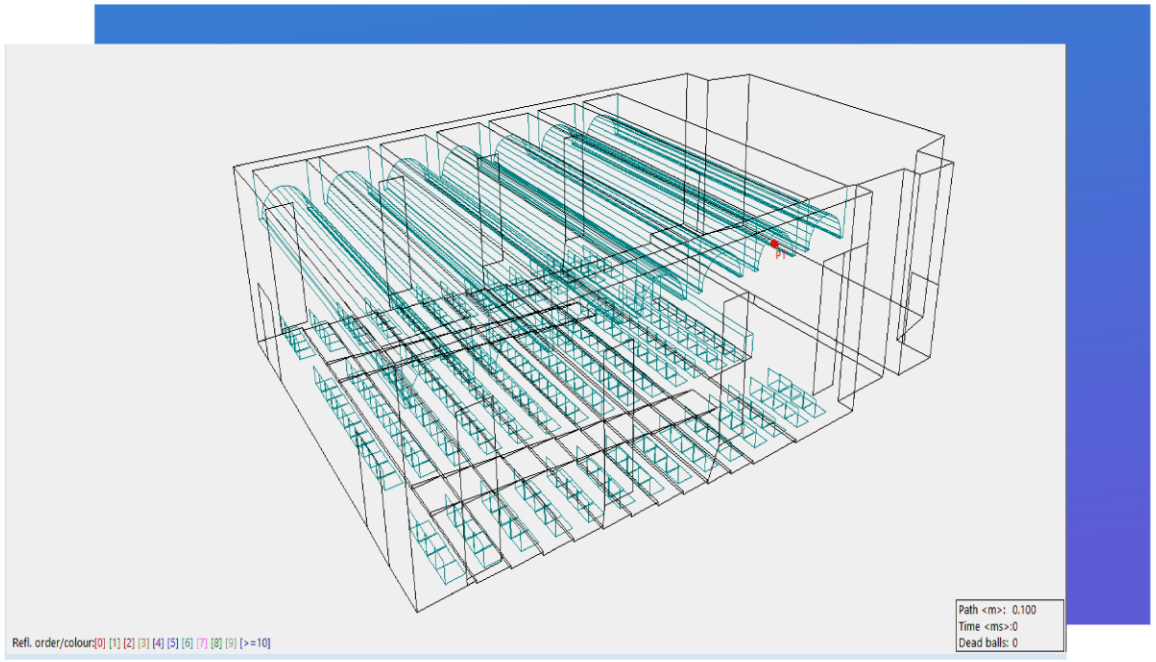
1、Space Modeling

According to the draw proportion 1:1 to simulation the real site situation

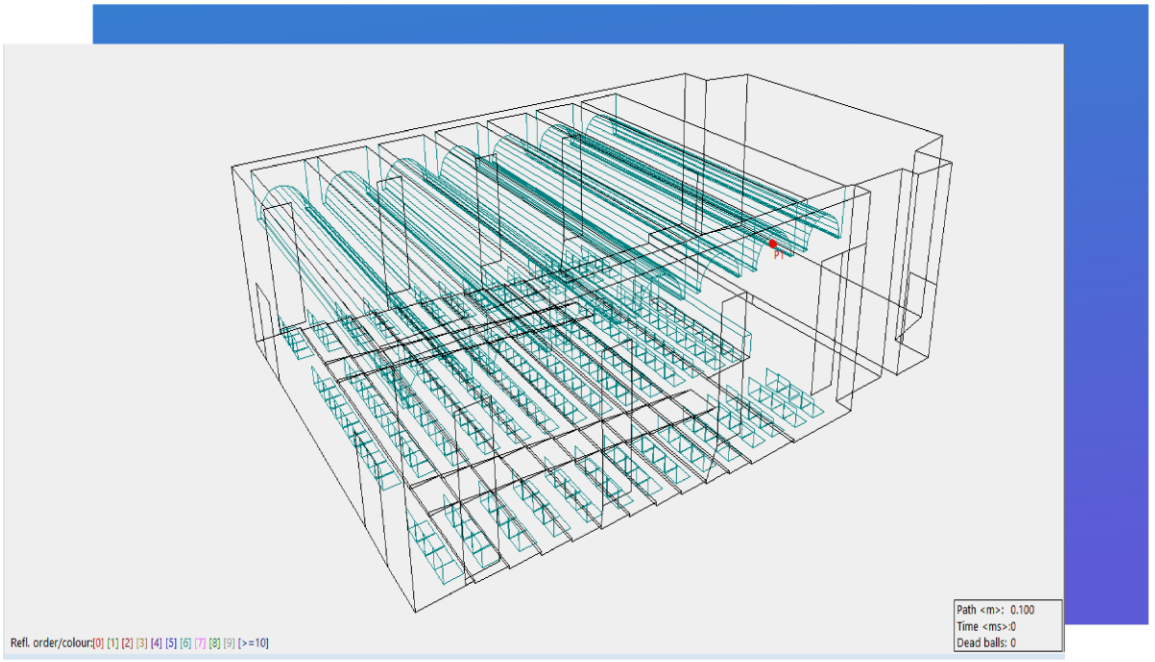
P1 in red is the sound source of the site
1, 2, 3, 4 in blue are the receive source for the audience

Simulation Analysis

2、Sound field analysis animation



Acoustic Particle Diffuse



Sound Ray Tracking

Explanation

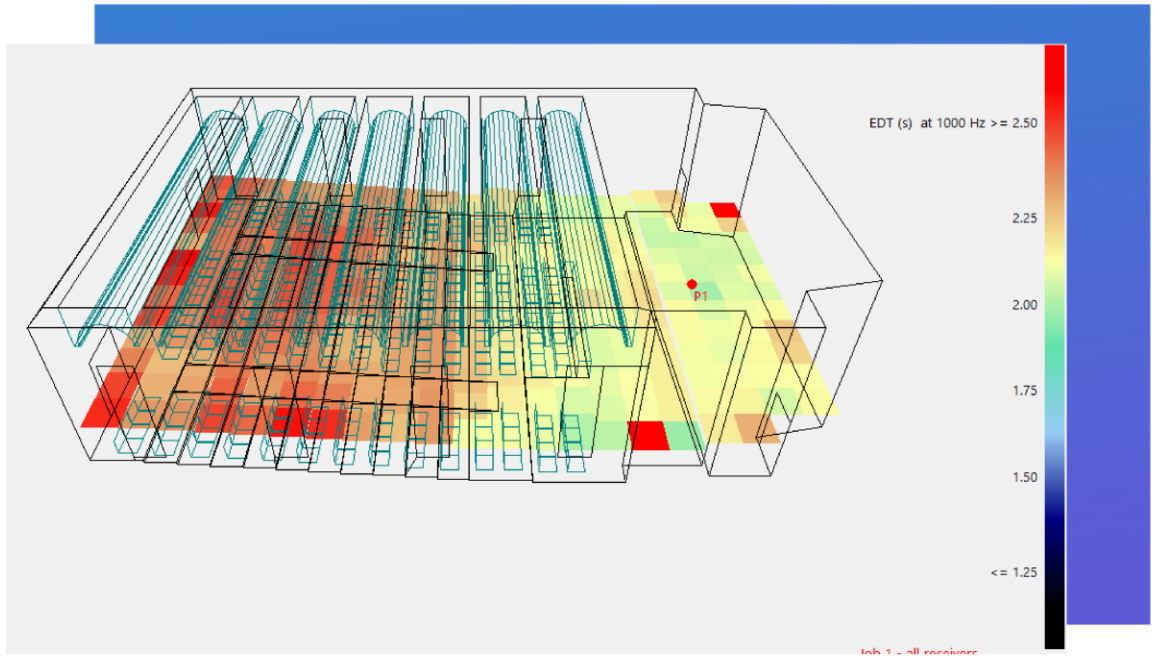
1、designed as a concave surface, which is easy to produce sound focusing (the concave surface forms a concentrated reflection of sound waves, making the reflected sound focus on a certain area, making the sound noisy and listening conditions in other areas worse.)

2、It is recommended to use a convex structure on the ceiling area, or use a full-band strong sound-absorbing material for construction on the ceiling.

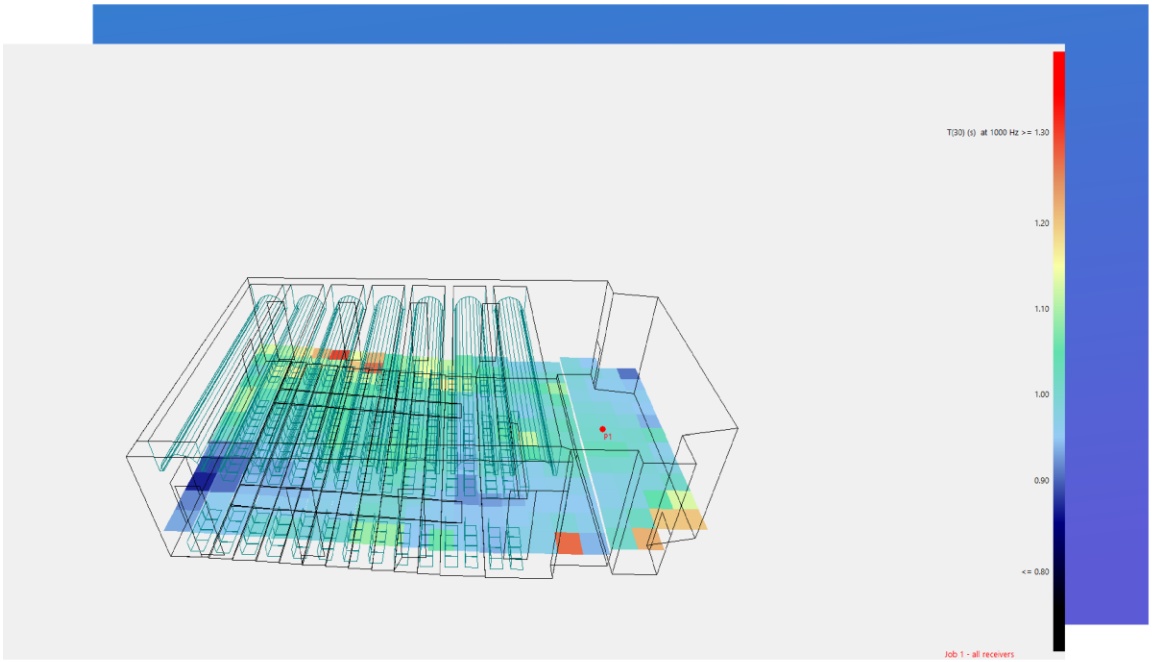
3、The stage entrance is a rectangular structure. It is recommended to use microporous sound-absorbing panels as the ceiling to prevent sound resonance.

Simulation Analysis

3、Effect comparison before and after acoustic optimization



The Distribution cloud map of T30(s)1000Hz
(without sound-absorbing material)

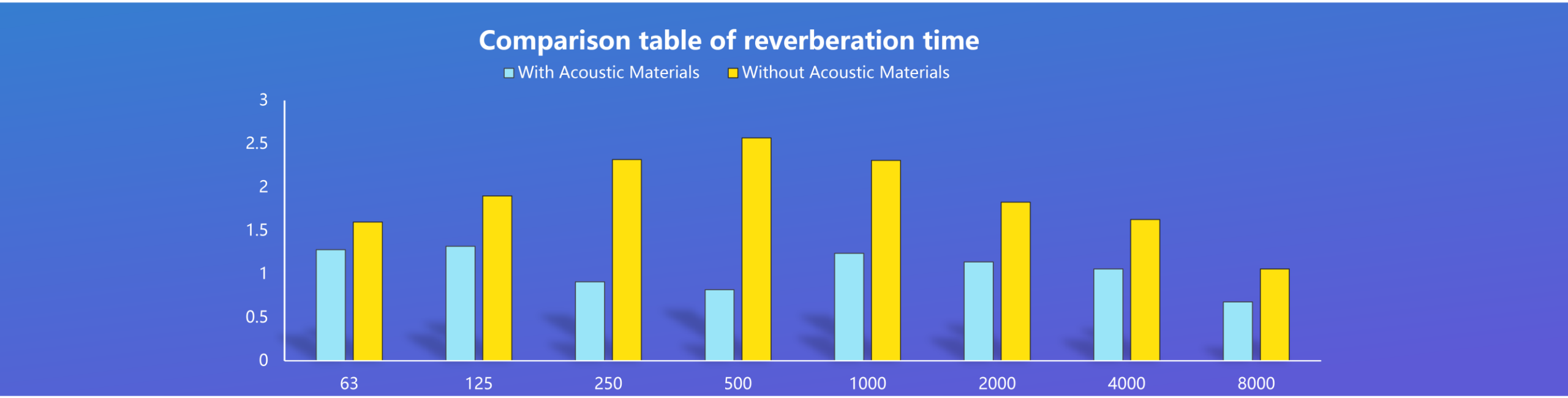


The Distribution cloud map of T30(s)1000Hz
(after optimization)

The picture on the left shows that there are no sound-absorbing materials used, and the reverberation time in the space is above 2S from the diagram. The picture on the right shows the improved space, and the reverberation time is controlled at about 1.2S.

Simulation Analysis

3、Space Acoustic Engineering Design



Note

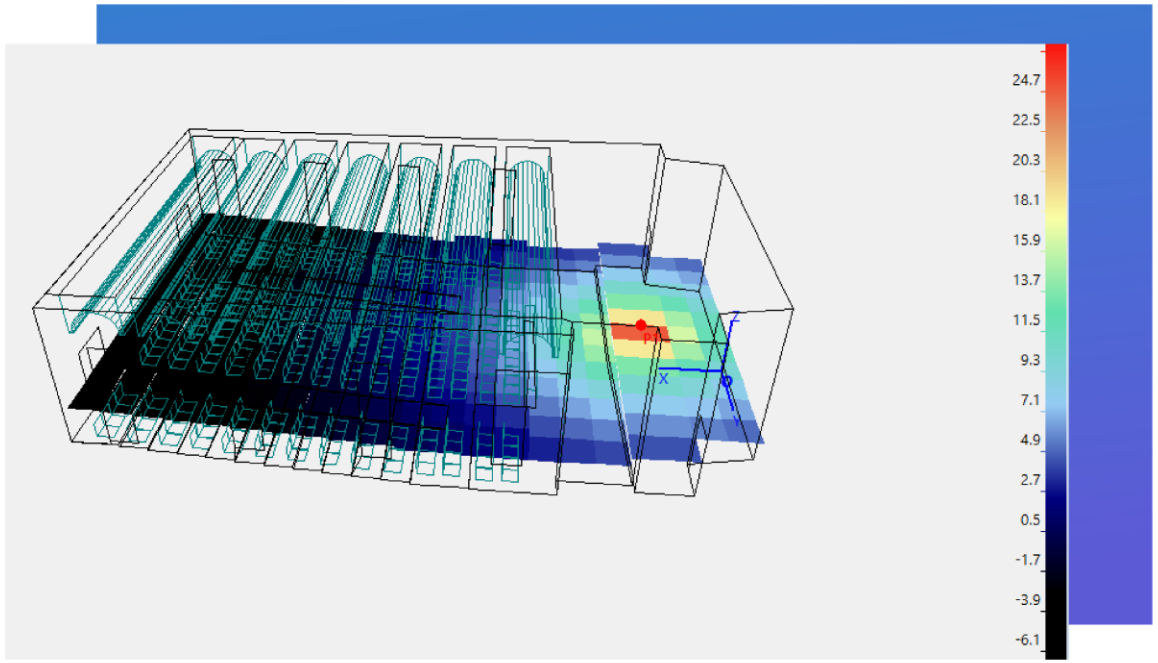
1、The on-site concave gypsum board ceiling has the problem of sound focusing, so it is necessary to change the shape of the ceiling or use sound-absorbing materials

2、The original design scheme, the reverberation time is about 2.5S, which cannot meet the requirements of the reverberation time of 1.2S in the national standard GB/50118

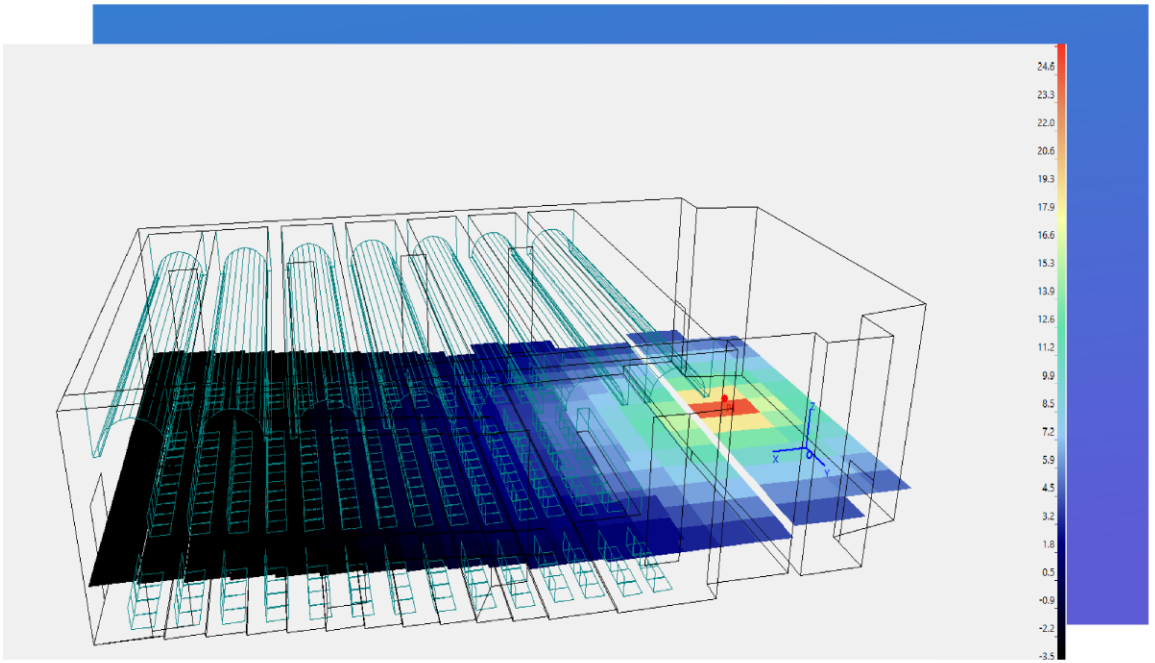
3、The space should be optimized for space acoustic design: when using microporous metal sound-absorbing panels on the walls on both sides of the auditorium, ensure that the walls have a concave-convex layered structure to prevent vibration echoes from parallel walls. The stage opening is a rectangular structure. It is recommended to use microporous sound-absorbing panel is used as the ceiling on the top surface to prevent sound resonance. Through simulation calculation, the reverberation time can be reduced to about 1.2S for the whole frequency band.

Simulation Analysis

3、Effect comparison before and after acoustic optimization



The Distribution cloud map of T30(s)1000Hz
(without sound-absorbing material)



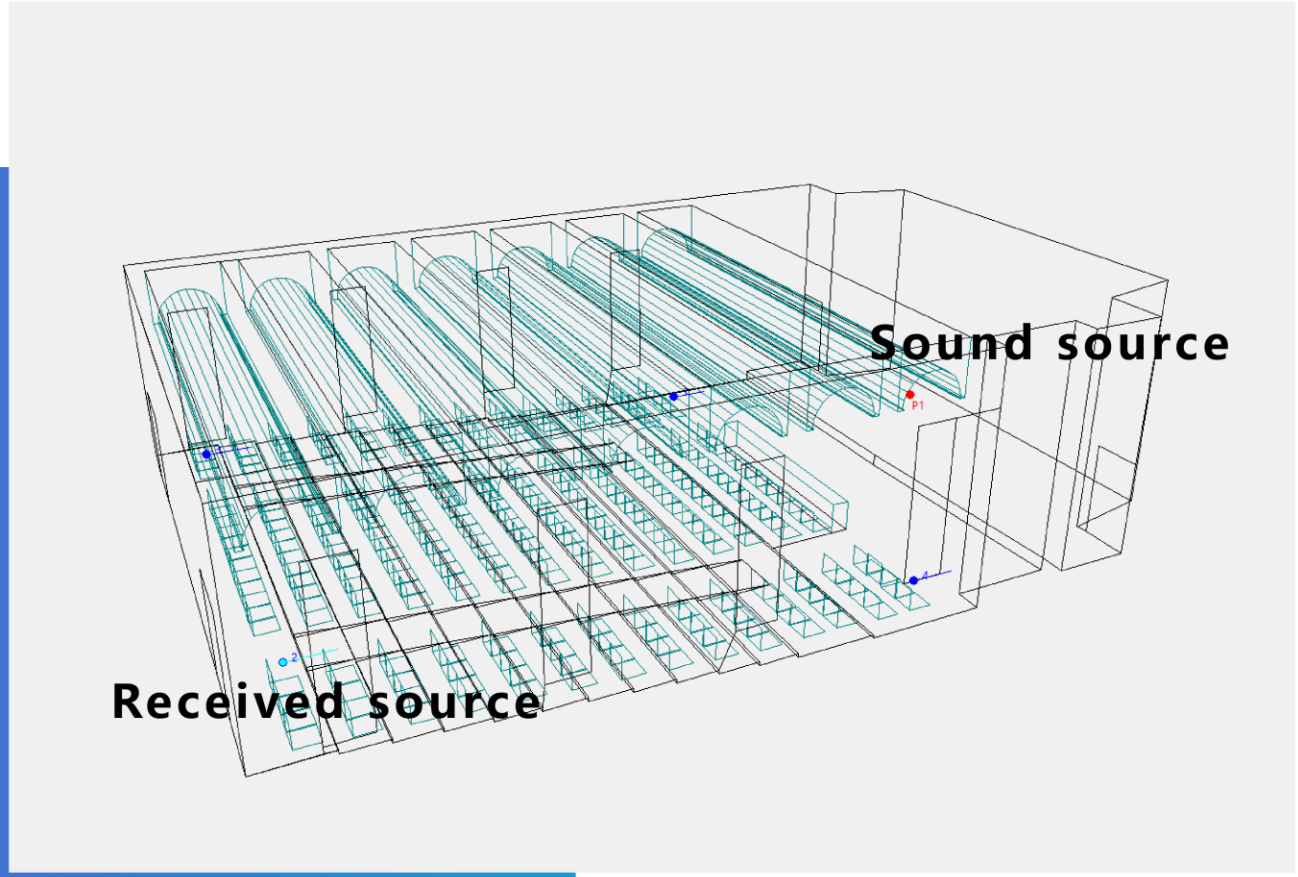
The Distribution cloud map of T30(s)1000Hz
(with sound-absorbing material)

Data Analysis from the Diagram

1、The left picture shows that the SPL (dB) is concentrated at about -6.1dB without considering the sound-absorbing material; the sound pressure level SPL (dB) is concentrated at about -3.5dB after the improvement in the right picture, and the sound pressure level has increased

2、6db, the loudness of the sound is increased.

Simulation Analysis



4、Simulation of sound effect

Click to play the sound effect after optimize

Click to play the sound effect without optimize

Simulation Analysis

The Suggestions of Space Acoustic Engineering Design

The stage entrance is a rectangular structure, and it is recommended to use microporous sound-absorbing panels on the top surface to prevent sound resonance.

sound design	National standards		Original site	After Design
	reverberation time < 1.2S		2S	< 1.2S in all frequencies
	Suggested materials in use	Install the 170 ㎡ iMicro X board on the side wall, and the finished surface distance from the wall is 50-100mm		
		The stage entrance is a rectangular structure, and it is recommended to use microporous sound-absorbing panels on the top surface to prevent sound resonance.		
		It is recommended to make the top surface concave shape into a convex shape or use perforated gypsum board + mineral wool for top surface construction		
Noise Control	National standards		Original site	After Design
	Noise level is allowed under 40db		/	/
	Suggested materials in use	The sound insulation performance of the wall is recommended to reach more than 50db		
		The door uses a sound insolation wooden door, and the sound insulation performance can reach more than 35db		

iSound®

Provide Elegant Sound Aesthetics for Every Space!