
i Sound®
The acoustic solution report
of International Conference Hall

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Contents

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Space overview

Space description, Materials Application, On-site testing

Space overview

1、Space Description

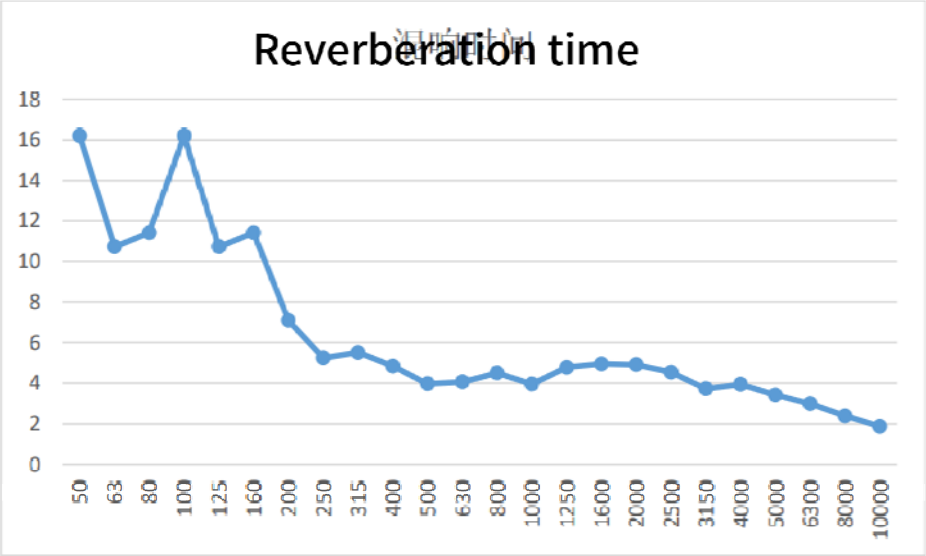
The space which requires the architecture acoustic design, is a 764㎡ conference room.

2、Materials application

Area	Materials	Diffuse reflection coefficient
Ceiling	Gypsum Sheet	0.05
Floor	Carpet	0.2
Wall	Leather board	0.05
	Marble	0.05
	Door	0.05
Furniture	Chairs	0.05
	Table	0.05

Space overview

3、On-site Testing



Conclusion: The space is a cylindrical structure, and the building structure itself has acoustic defects such as howling and sound focusing. No acoustic materials were used on site, only the leather board, white paint, marble, etc. have no sound absorption performance. The field test data is above 16S in the low frequency, and the reverberation time in the 500-1000hz frequency band is 4-5S. The reverberation time in this space is too high, which seriously affects the conference effect.

Design Scope
Design content

Design Scope, Design content

Design Scope, Design content

1、Design Scope

The 764m2 conference room, accommodating 300 people and above, needs to accomplish the function of low reverberation time, get a high speech intelligibility.

Area	Lecture Hall
Room Volume	About 18163.7m^3
Total Surface area	About 6421.28 m^2
Total Seat No.	Around 300 seats
Length	31.6meters
Width	31.6meters
Height	54.35meters

2、Design Content

The interior space acoustic design of the conference room.

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.

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Design Reference

Space data, National Standard Requirements

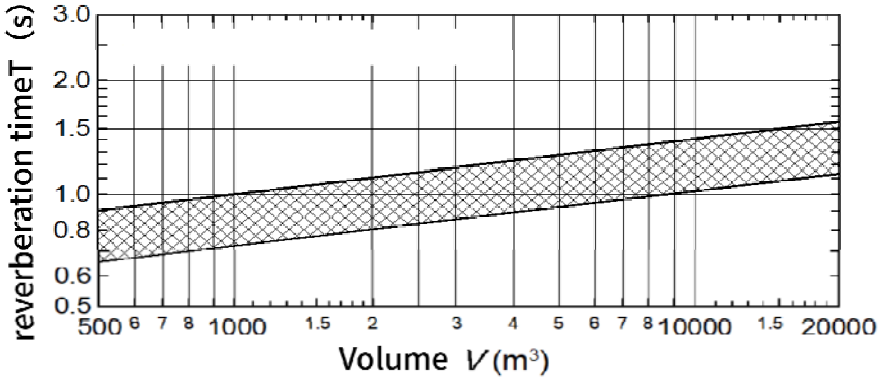
Design Reference

1、Space Data

The decoration implement draws of International Conference Room
National Standard GB3096-2008《Acoustic Environmental Quality Standards》
National Standard GB50118-2010《Code for sound insulation design of civil buildings》

2、National standard Request

According to GB50118-2010 Specifications of《Code for sound insulation design of civil buildings》 the reverberation time standard of this space be around **2S**



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Simulation Analysis

Modeling, Sound field analysis animation,
Room Acoustic Parameters, Sound Simulation

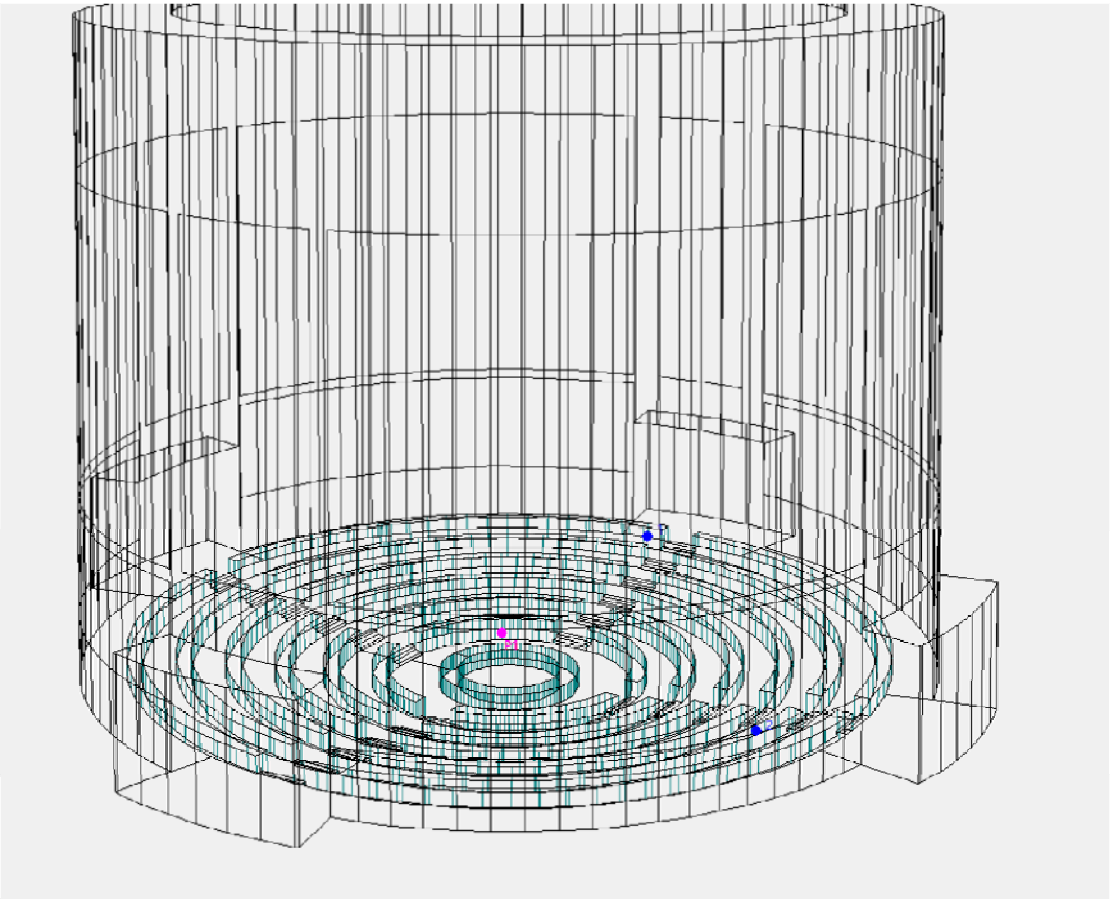
Simulation Analysis

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

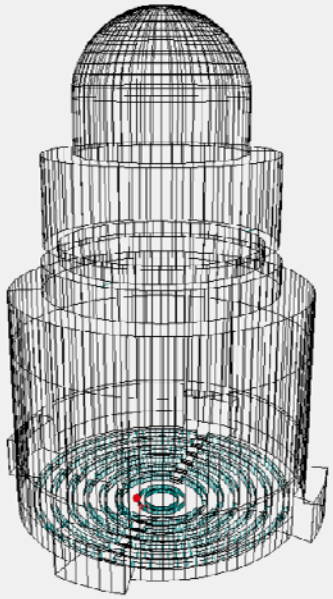
1, 2, 3, 4 in blue are the receive source for the audience



Simulation Analysis

2、Sound field analysis animation

Acoustic Particle Diffuse



反射次数

Refl. order/colour: [0] [1] [2] [3] [4] [5] [6] [7] [8] [9] [>=10]

Path <ms>: 0.100
Time <ms>: 0
Dead balls: 0

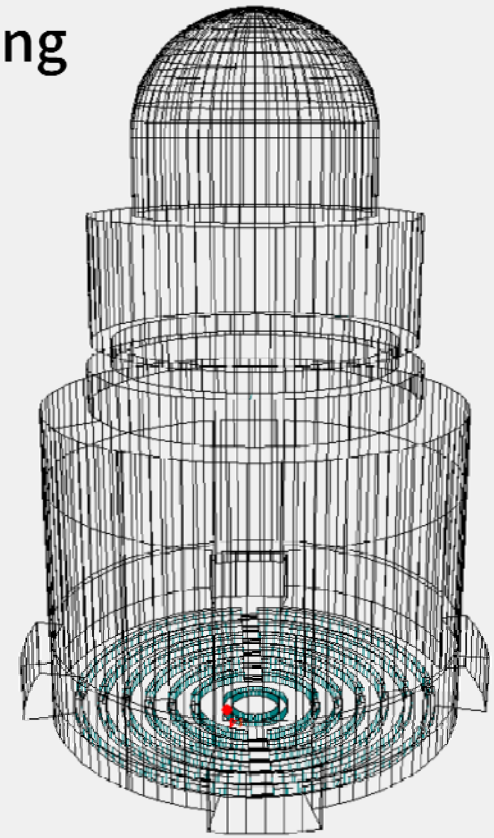
Intruction

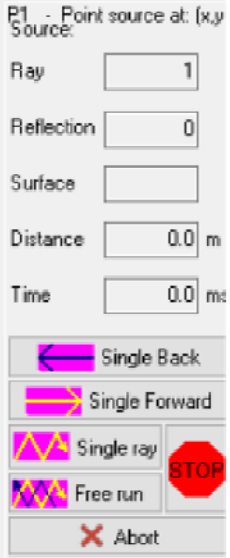
According to the analysis of the scene dynamic diagram, the sound reflected seriously on the podium in the conference room, and continued to reflect after being transmitted to the middle and top, resulting in the deviation of the on-site reverberation time and continuous echo after speaking.

Simulation Analysis

2、Sound field analysis animation

Sound Ray Tracking



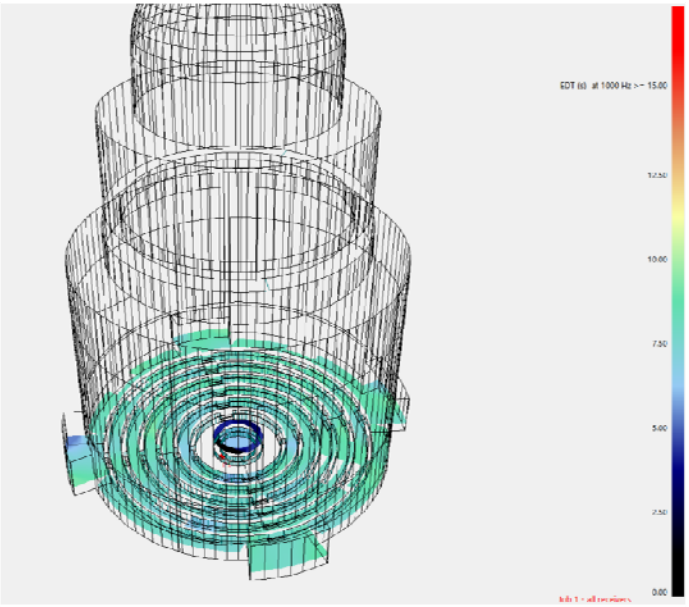


Intruction

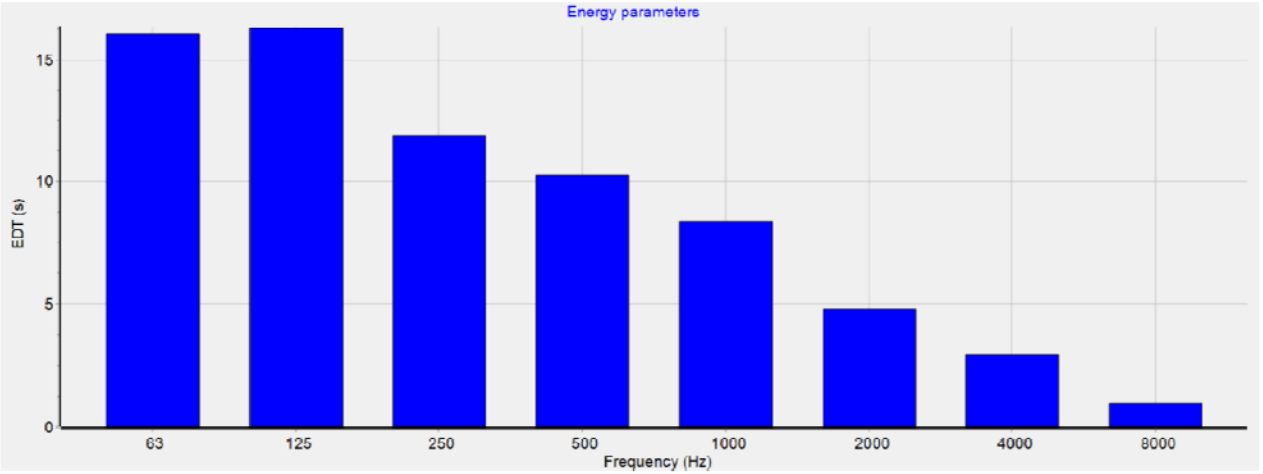
There is serious reflection on the site, including concave top surface and concave ground, and there are defects of acoustic focusing. (Acoustic focusing refers to the phenomenon that the concave surface forms a concentrated reflection of sound waves, so that the reflected sound is focused on a certain area, causing the sound to be particularly loud in that area.)

Simulation Analysis

3、Simulation image of original design Reverberation time



Distribution cloud map (before Re-design)



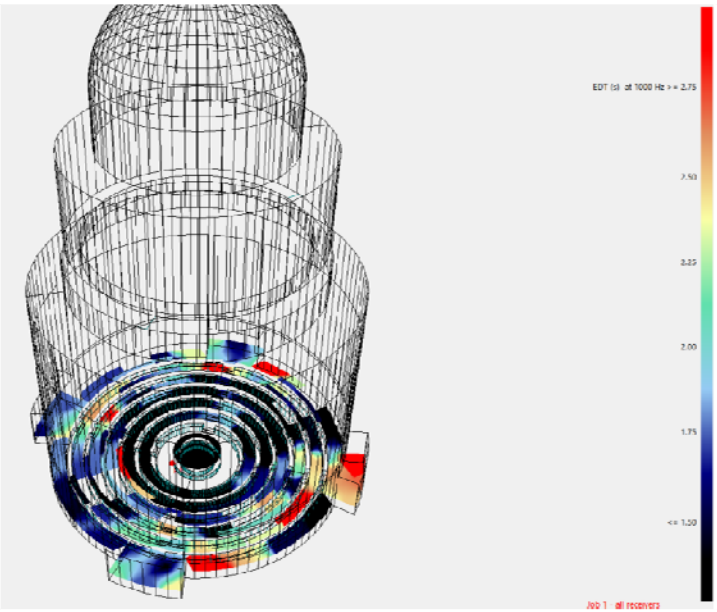
T30(s) Reverberation time Curve(before Re-design)

The picture on the left shows the status of reverberation time at the scene. From the pattern, it can be seen that the reverberation time in the space is above 7S

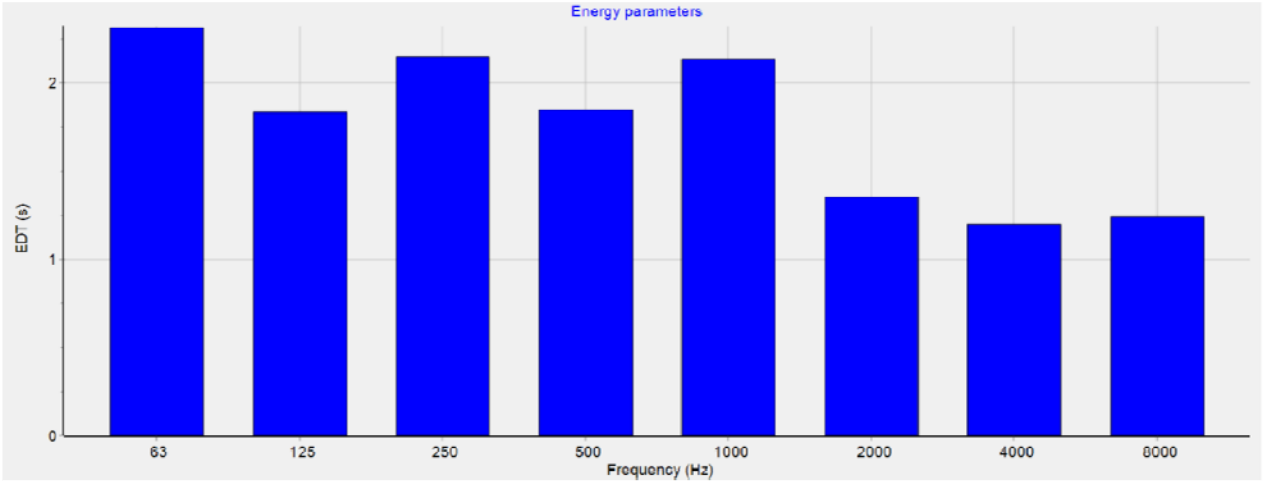
The picture on the right shows the reverberation time after P1 is sounded Curve

Simulation Analysis

3、Improved reverberation time simulation image



Distribution cloud map (after Re-design)



T30(s) Reverberation time Curve(after Re-design)

The picture on the left shows the status of reverberation time at the scene. From the pattern, it can be seen that the reverberation time in the space is above 2S

The picture on the right shows the reverberation time after P1 is sounded

Simulation Analysis

Acoustic Parameter before Re-design

SPL(A)	13.1	dB
SPL(Lin)	17.2	dB
SPL(C)	16.9	dB
SPL(A_Direct)	6.3	dB
STI	0.36	
STI(Female)	0.15	
STI(Male)	0.15	
STIPA	0.13	
RASTI	0.31	
STI(expected)	0.07	
EDT(Average)	9.31	s
T(20_Average)	8.61	s
T(30_Average)	8.28	s
G(Average)	8.3	dB
D(50_Average)	0.18	
C(80_Average)	-5.7	dB
Ts(Average)	566	ms
LF(80_Average)	0.047	
Lj(Average)	4.4	dB
BR(RT)	1.5	
BR(SPL)	1.7	dB
SIL	6.3	dB
AI	1.00	
Alcons(STI)	24.48	%
Arrival(early)	31	ms
Density(reflections)	13	/ms

Speech clarity Index

After Re-design

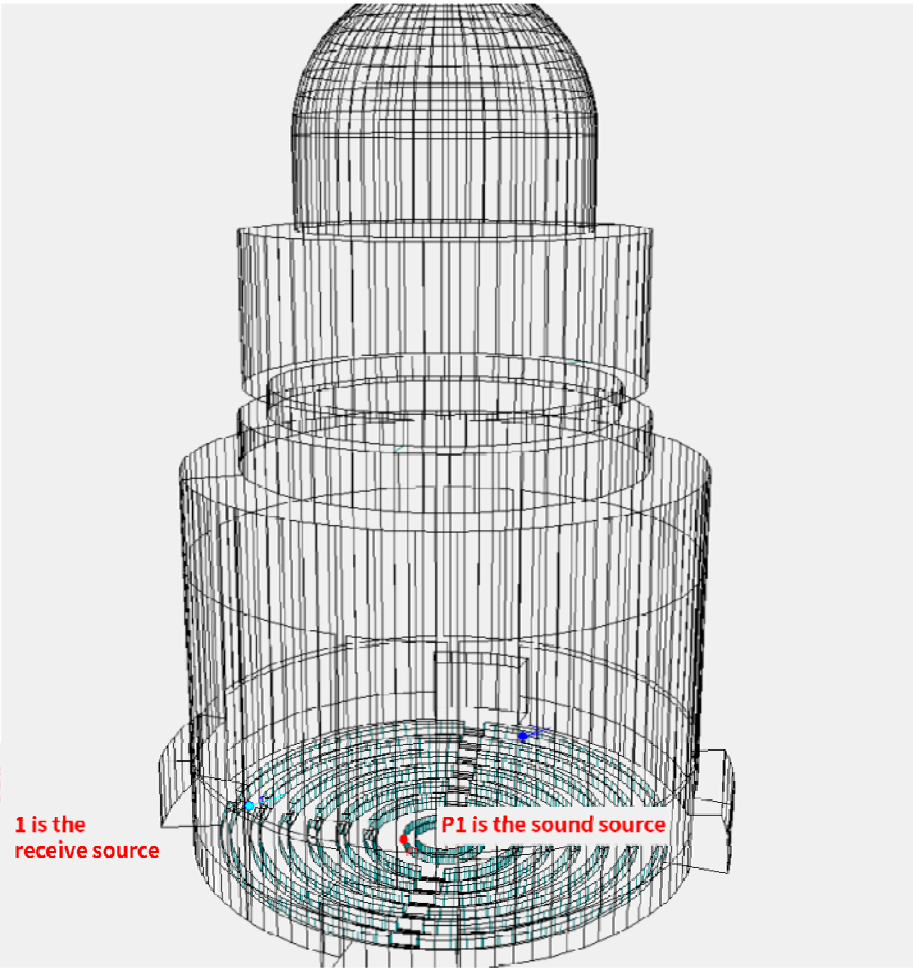
Reverberation time

Acoustic Parameter after Re-design

SPL(A)	8.4	dB
SPL(Lin)	10.6	dB
SPL(C)	10.2	dB
SPL(A_Direct)	6.3	dB
STI	0.65	
STI(Female)	0.18	
STI(Male)	0.18	
STIPA	0.18	
RASTI	0.62	
STI(expected)	0.16	
EDT(Average)	1.99	s
T(20_Average)	2.24	s
T(30_Average)	2.26	s
G(Average)	2.2	dB
D(50_Average)	0.61	
C(80_Average)	4.1	dB
Ts(Average)	78	ms
LF(80_Average)	0.128	
Lj(Average)	-8.1	dB
BR(RT)	1.1	
BR(SPL)	-0.4	dB
SIL	6.3	dB
AI	1.00	
Alcons(STI)	5.76	%
Arrival(early)	31	ms
Density(reflections)	9	/ms

Simulation Analysis

5、Sound Effect Simulation



P1 is the sound source, 1 is the receive source

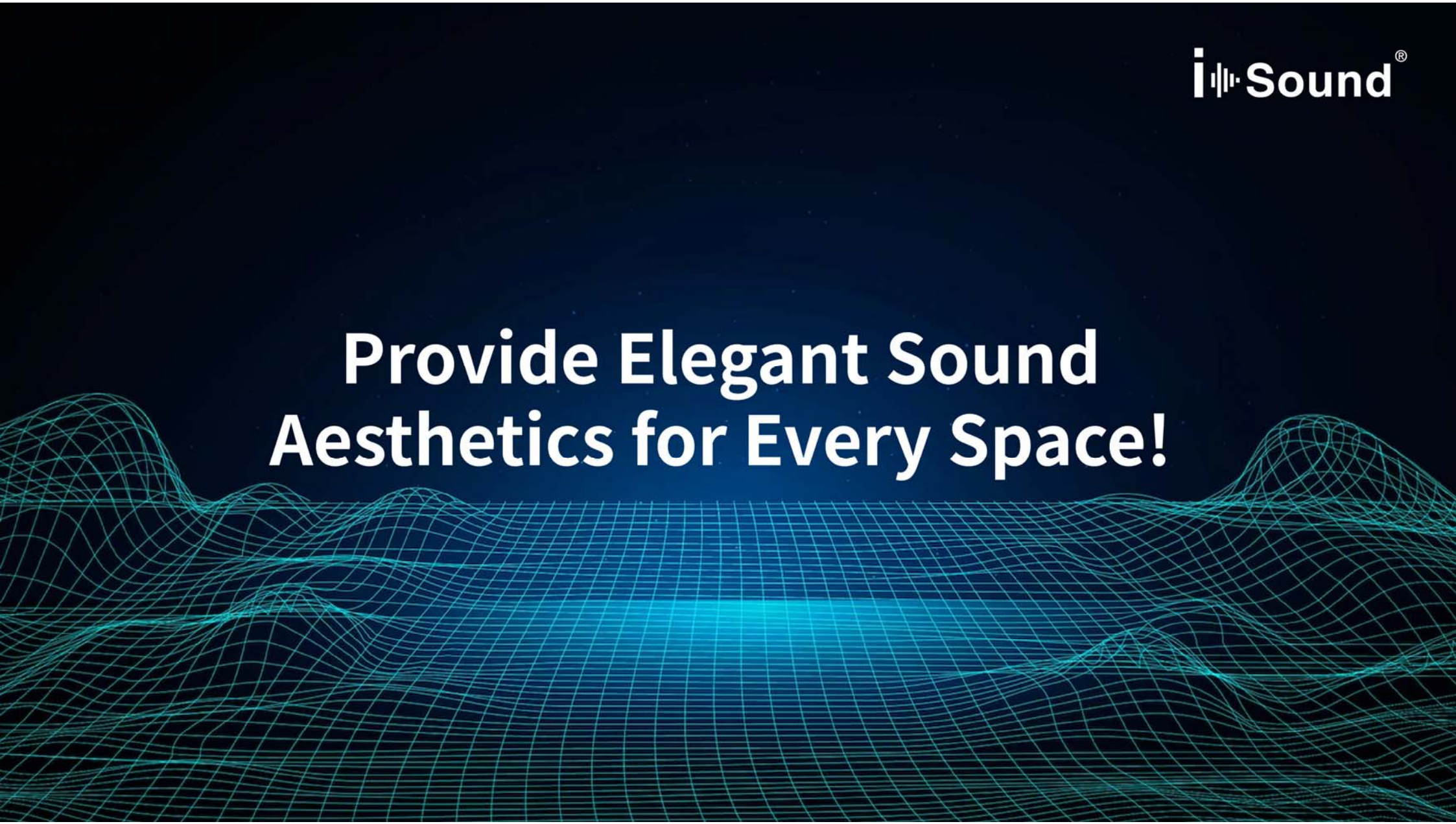
Click to play sound effect after optimize

Click to play sound effect after optimize

Simulation Analysis

6、The Suggestions of Space Acoustic Engineering Design

sound design	National standards	Original site	After Design
	reverberation time＜2S	8.2S	Around 2S
	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 leather board on the wall is replaced by an ultra-microporous metal sound-absorbing panel, It is expected to be around 600 ㎡ (Noise Reduction Coefficient NRC0.6 or above, FR A).	
		Add ultra-microporous metal sound-absorbing panels to the white paint area on the ceiling, which is estimated to be about 200 square meters (noise reduction coefficient NRC0.6 or more, FR A).	


i Sound®
Provide Elegant Sound
Aesthetics for Every Space!