The acoustic solution report of Physical Examination Center

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Space overview

Space description, Materials Content, Filed testing

Space overview

1、Space Description

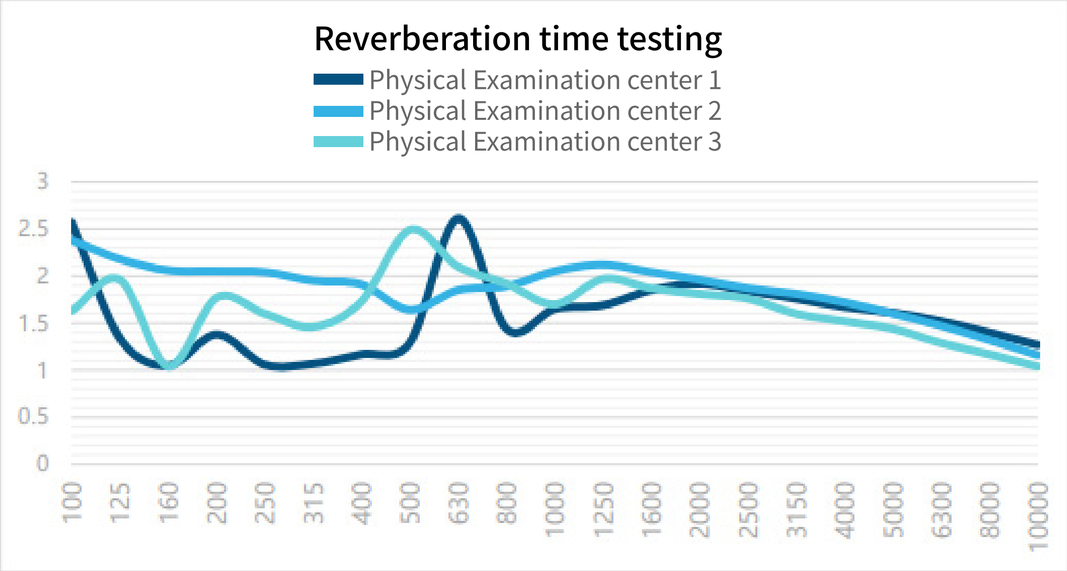
The space which required the architecture acoustic design, is an area of 549.16㎡ Physical Examination Center

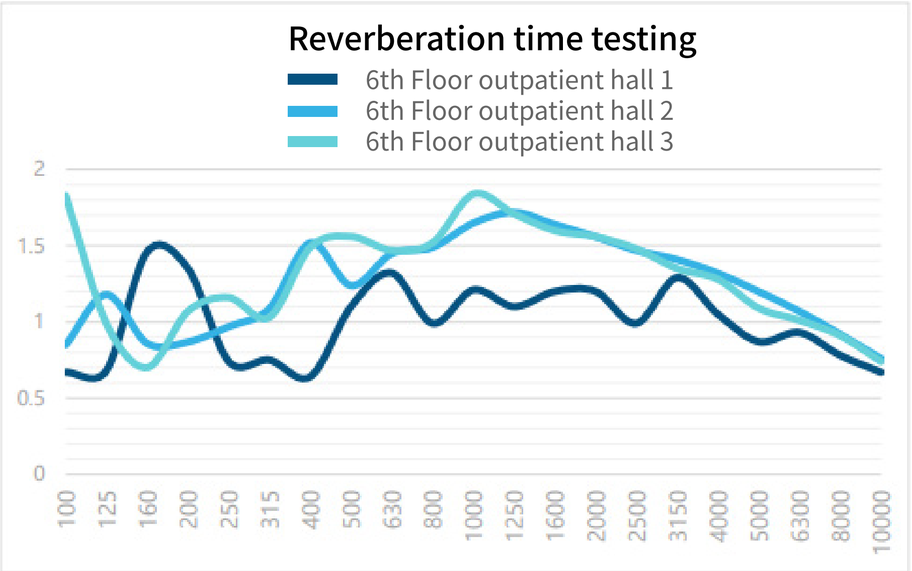
2、Materials applied

Area	Materials	Diffuse reflection coefficient
Ceiling	Gypsum Board	0.2
Floor	GTerrazzoard	0.02
Wall	Woodgrain Laminates	0.05
	Wood Door	0.05
Furniture	Chairs	0.03
	Table	0.05

Space overview

3、Filed Testing





Conclusion

When there are many people on site, the noise is between 75-80db, and when there are no people, it is about 60db.
The height of the physical examination center is 2.2 meters. No sound-absorbing materials are used on site. The walls and the ceiling are all reflections, so the reverberation time is higher than 2S. The floor height is low and the number of reflections is high, so the sound is noisy. It is recommended to use sound-absorbing panels on the top surface and crowded areas to improve the reverberation time in the room.
The outpatient hall on the 6th floor is 2.75 meters high, and the site is not a closed space, so the test reverberation time is below 2S, concentrated in the 1.5S interval, and the floor height is higher than that of the physical examination center, so the sound effect is better than that of the physical examination center.

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Design Scope
Design content

Design Scope, Design content

1、Design Scope

The physical examination center has area of 549.16 ㎡ and accommodates 100-150 people need to accomplish the function of high speech intelligibility

Area	Examination center hall
Room Volume	About 1263m^3
Total Surface area	About 1838.57 ㎡
Total Seat No.	Around 100-150seats
Length	34.98meter
Width	54.18meter
Height	2.2 meter

2、Design Content

The interior space acoustic design of the physical examination center. 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 details, National Standard Requirements

Design Reference

1、Space Details

The decoration implement draws of physical examination center
The National Standard GB3096-2008《Acoustic Environmental Quality Standards》
The national Standard GB50118-2010 Code for sound insulation design of civil buildings

2、National standard requirements

TAccording to GB50118-2010 Specifications for architectural acoustic design of civil Architectures the reverberation time standard of the physical examination center will no large than 1.5S, the ceiling area of the corridor, need to have some sound absorbing solution, the NCR of the ceiling materials should be large than 0.4

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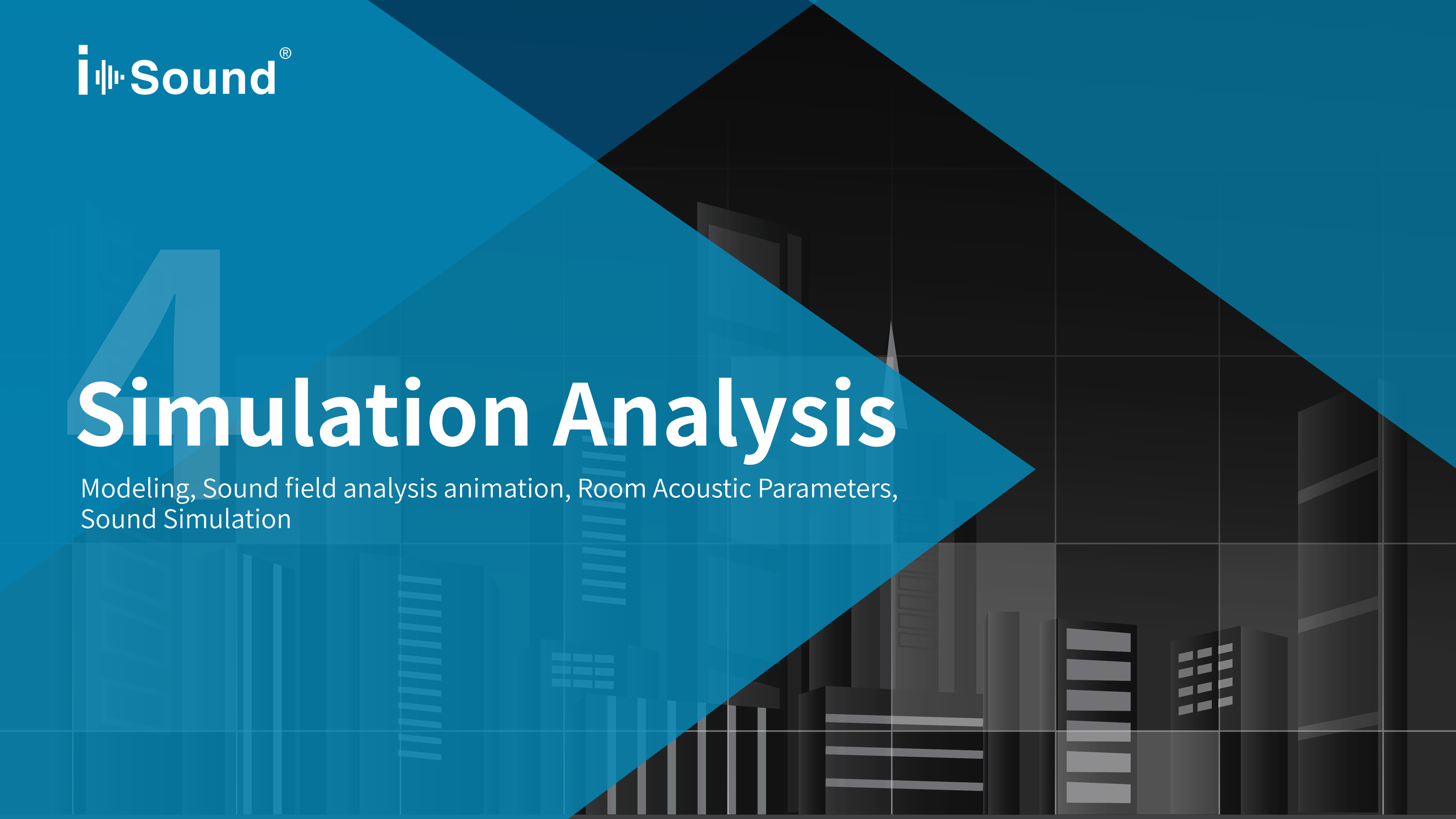
Simulation Analysis

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



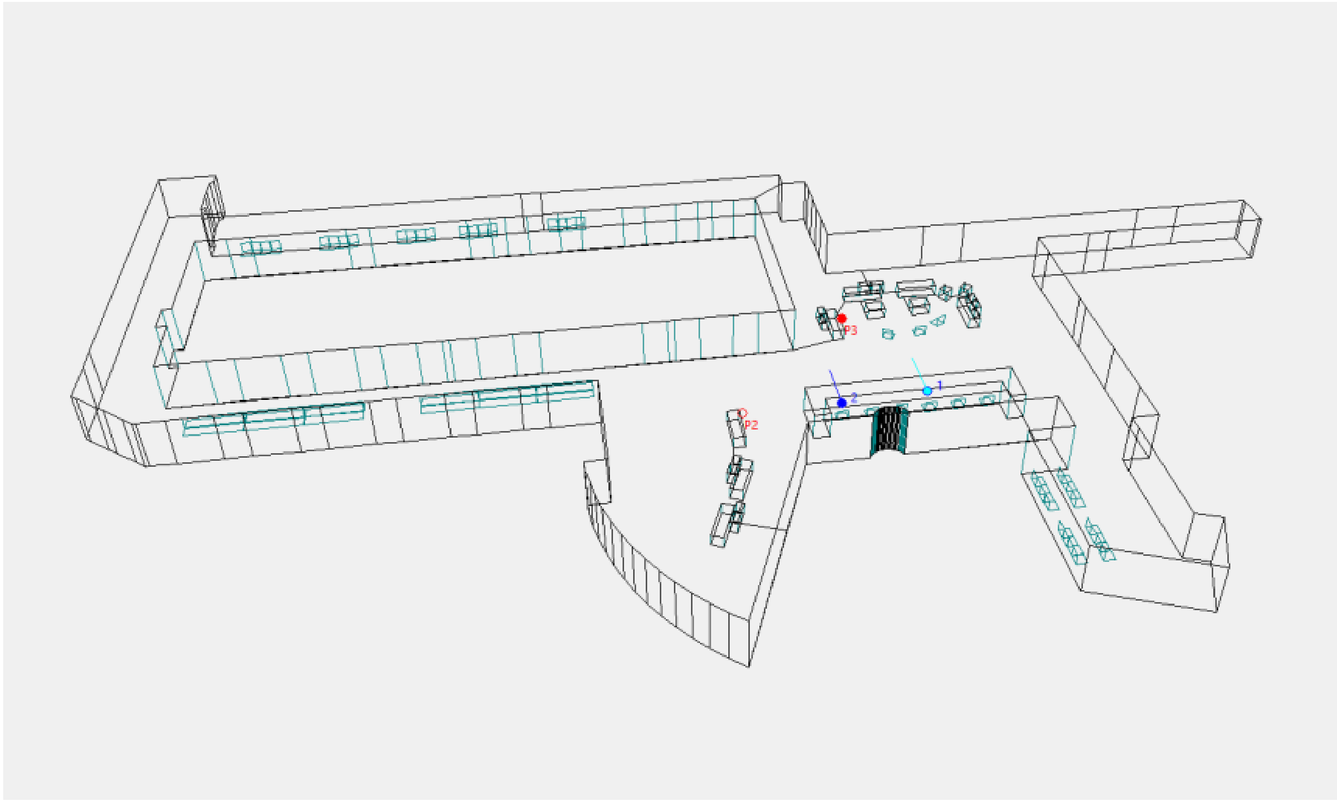
Simulation Analysis

1、Space Modeling

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

P2 and P3 in red is the sound source of the site

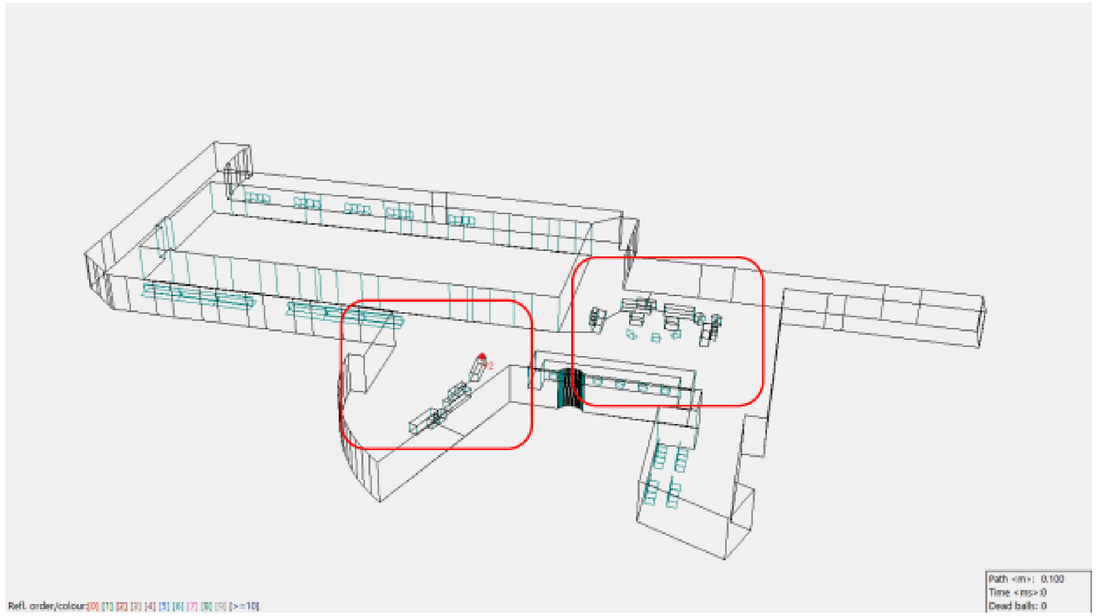
1, 2 in blue are the receive source for the audience



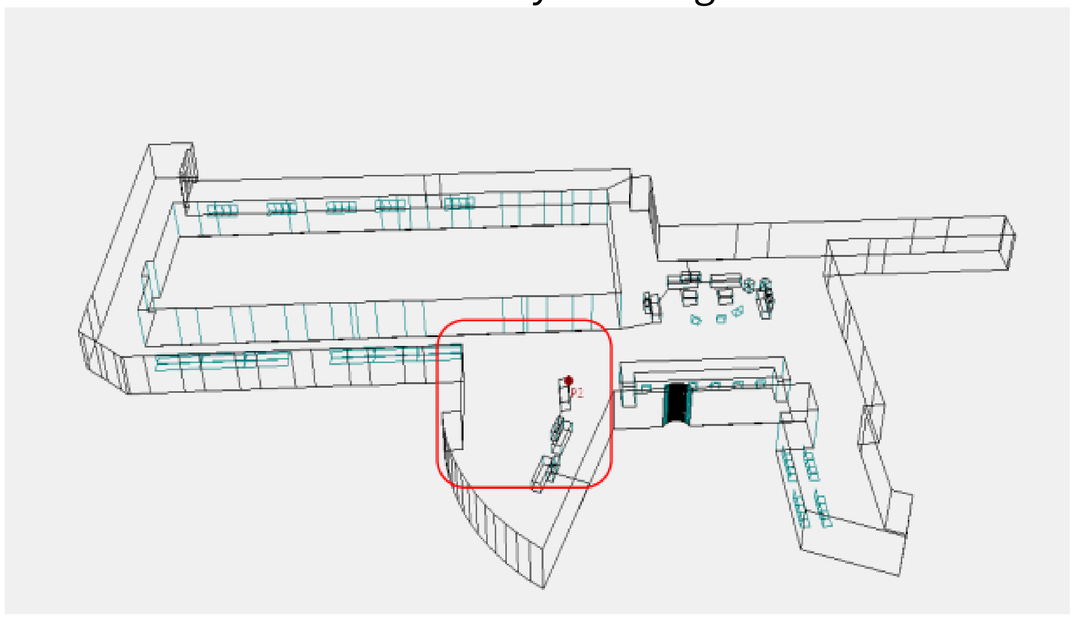
Simulation Analysis

2、Sound field analysis animation

Acoustic Particle Diffuse



Sound Ray Tracking



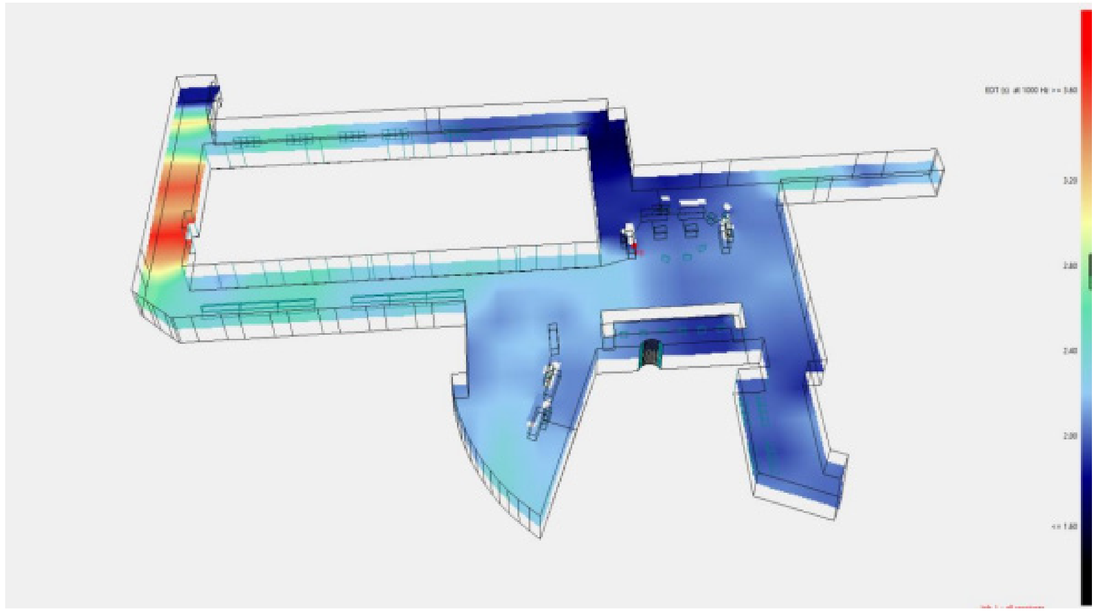
Explanation

1、Through sound particle reflection and sound ray tracking, the red area of the simulated animation reflects the dense reflection of the site, resulting in noisy sound and poor language clarity.

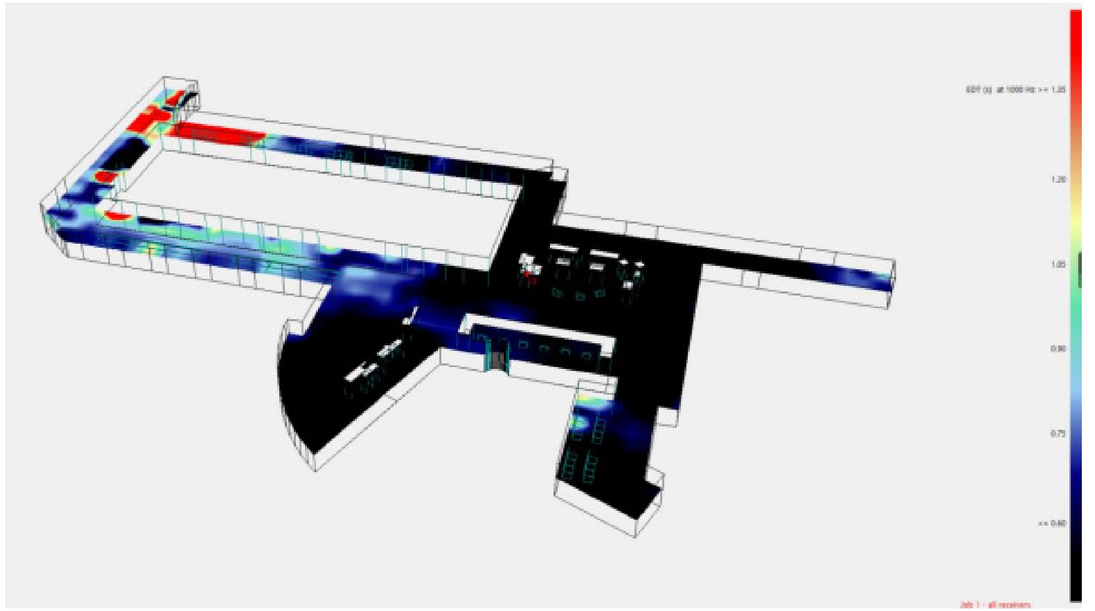
2、It is recommended to use microporous metal sound-absorbing panels in the ceiling area for renovation to reduce the frequency of reflected sound in the room

Simulation Analysis

3、Effect comparison before and after acoustic optimization



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

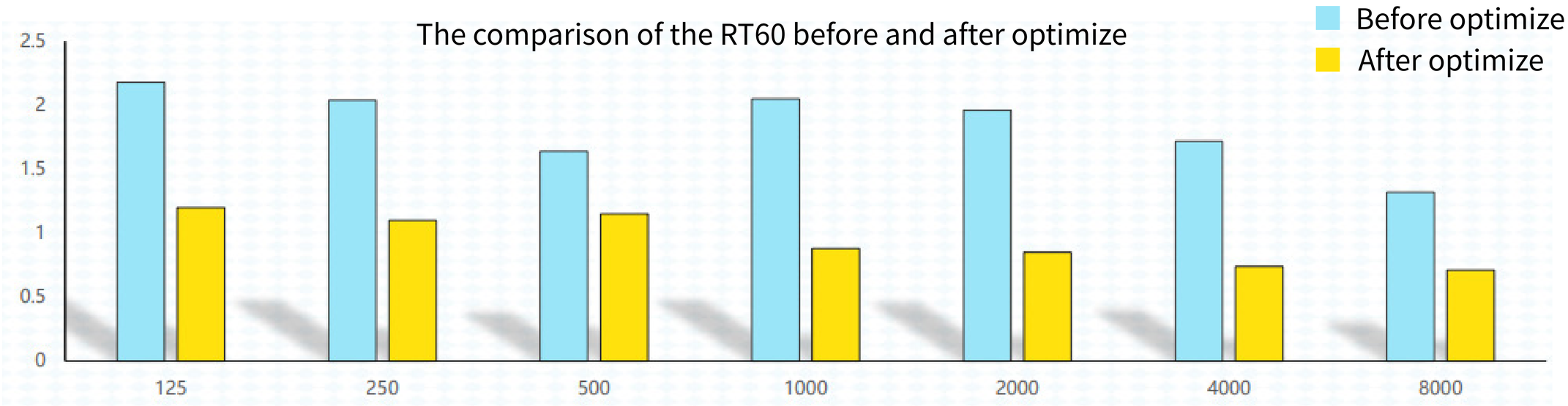


The Distribution cloud map of T30(s)1000Hz
(after optimization)

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 0.75S-1.5S.

Simulation Analysis

4、Space Acoustic Engineering Design



Note

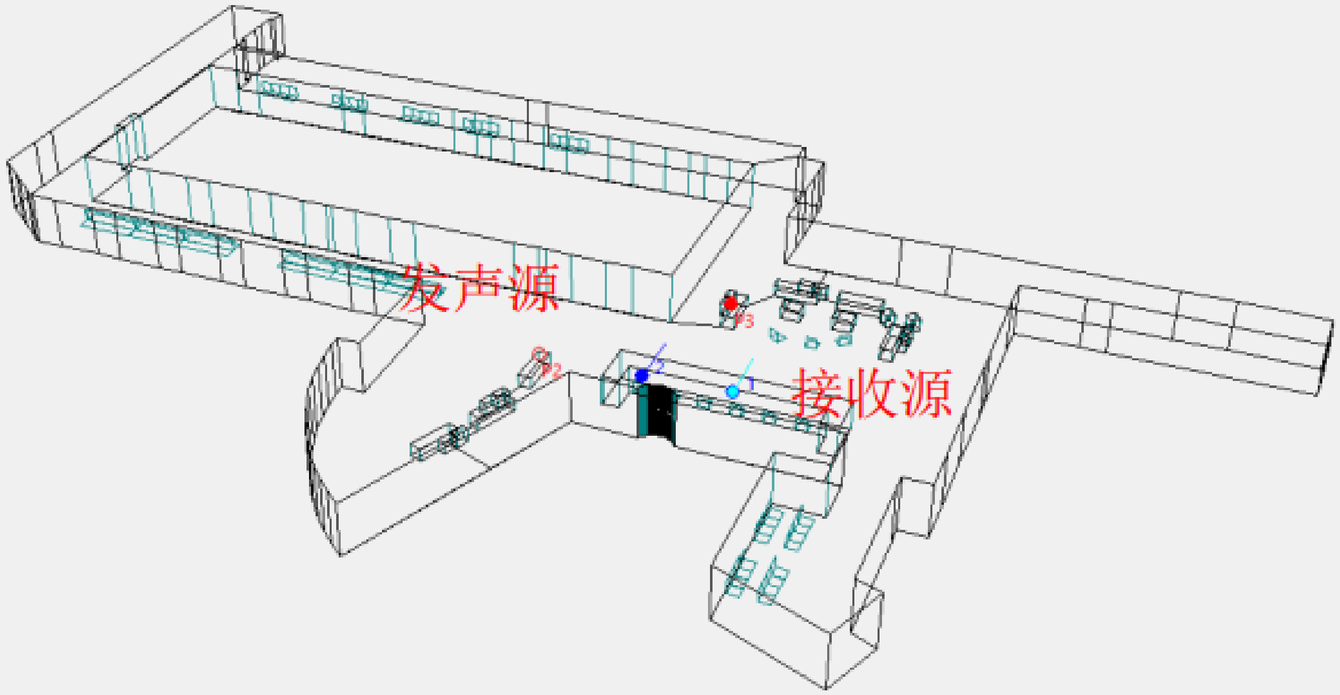
1、On-site gypsum board ceiling has the problem of dense sound reflection affecting language clarity, and the top surface needs to use sound-absorbing materials with a NRC of 0.6 or more;

2、 The original design scheme, the reverberation time is about 2S, which cannot meet the requirements of the reverberation time of 1.5S in the national standard GB/50118;

3、The space should be optimized for space acoustic design: 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 1.5S for the whole frequency band.

Simulation Analysis

5、Sound effects simulation



P1 is the sound source,
1 is the receiving source

Click the horn button to play the effect before optimize

Click the horn button to play the effect after optimize

Simulation Analysis

6、The Suggestions of Space Acoustic Engineering Design

sound design	National standards	Original site	After implement
	reverberation time＜1.5S	2S	About 1.5S in all frequencies
	Suggested materials in use	Remain use the same design as original for the wall cladding	
		The waiting zone and corridor ceiling is recommend to use imicro Star® series ceiling, total area around 344 ㎡	

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Provide Elegant Sound Aesthetics for Every Space!