DT PRO User Manual

Introduction

DT-PRO Software delivers powerful 3D acoustic simulation and sound reinforcement system management capabilities, bridging architects, interior designers, audio system integrators, sound engineers, and acousticians. It enables early simulation of final sound quality during architectural acoustics and electroacoustic design phases, predicting and pre-optimizing the performance of implemented sound reinforcement systems.

Installation

The following instructions will guide you through installing the DT-PRO Software on your computer. Please be sure to read our End User License Agreement for information regarding your access to the DT-PRO Software.

Windows

- Windows Version: Windows 10 or later
- System: 64-bit operating system
- Compatibility: Graphics card and video drivers compatible with DirectX 11 Feature Level 10 or later and OpenGL 4.2 or later
- RAM: 4 GB (8 GB or more recommended)
- CPU: 2 GHz quad-core/eight-thread processor

- Graphics Card: Integrated graphics like Intel HD Graphics 630 or discrete graphics like NVIDIA GeForce GTX 1050 or AMD Radeon R7 370, compatible with DirectX 11 Feature Level 10 and OpenGL 4.2
- Hard Drive Space: 500MB+ available hard drive space

Installing DT-PRO Software on Windows

1. Download the Windows installer executable (.exe) and double-click to begin installation.
2. DT-PRO Software will install automatically. During installation, an installer interface will appear where you can select an appropriate installation path. Click Install, wait for the installer to complete, and the software will be ready to use.

Updating DT-PRO Software

When a new version of the app is available, a 🔴 icon will appear next to the version number in the top-right corner of the app's main interface, indicating a new version is ready for download. Tap it to download the update.

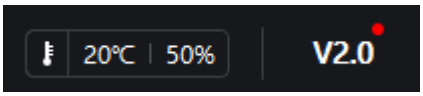


Table of Contents

DT-PRO Software User Manual

1. Getting Started

After installation, double-click the Windows icon to launch the DT-PRO Software. Wait for the software to complete. You will be taken to the DT-PRO Software main launch page.

The main launch page allows you to perform various global operations:

- Entering the mobile performance simulation mode and automatically creating an empty mobile performance simulation project (.dal)
- Entering the room simulation mode and automatically creating an empty room simulation project (.daf)
- Log in and manage your DT account

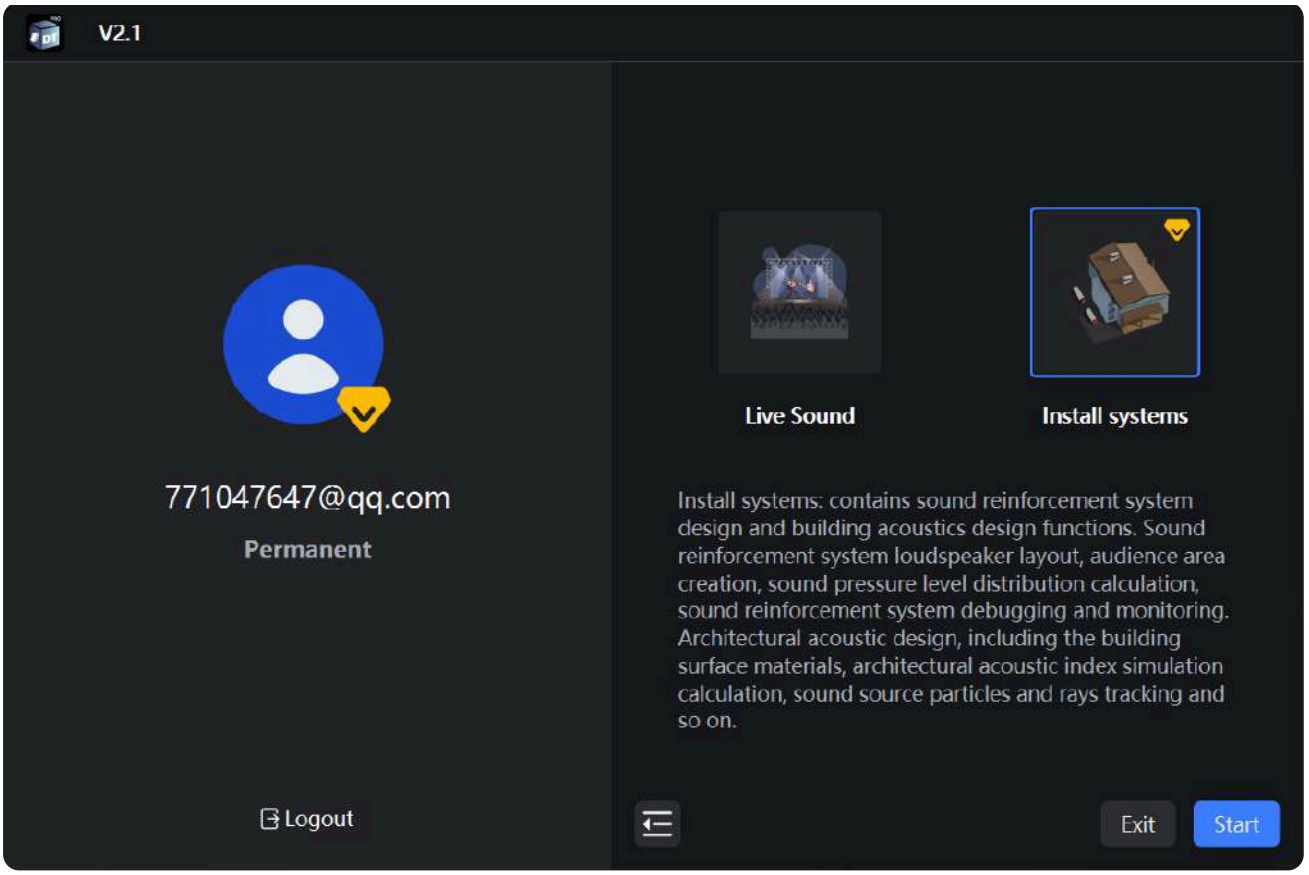


Figure 1-1 Working mode selection of DT-PRO software

2. Account Management

2.1Login

The startup page allows you to log in to the software using your DT account. You must log in to access additional value-added features and synchronize with cloud databases, such as architectural acoustics calculations for interior acoustics simulations. The software offers multiple login methods. If this is your first time using the DT platform app, you can register a new DT account here. After logging in, your account information will be displayed on the left side of the startup page. Once you've logged in, you can continue using the software without an active internet connection. This allows you to perform design work offline in remote locations or while traveling, without the need for a constant internet connection.

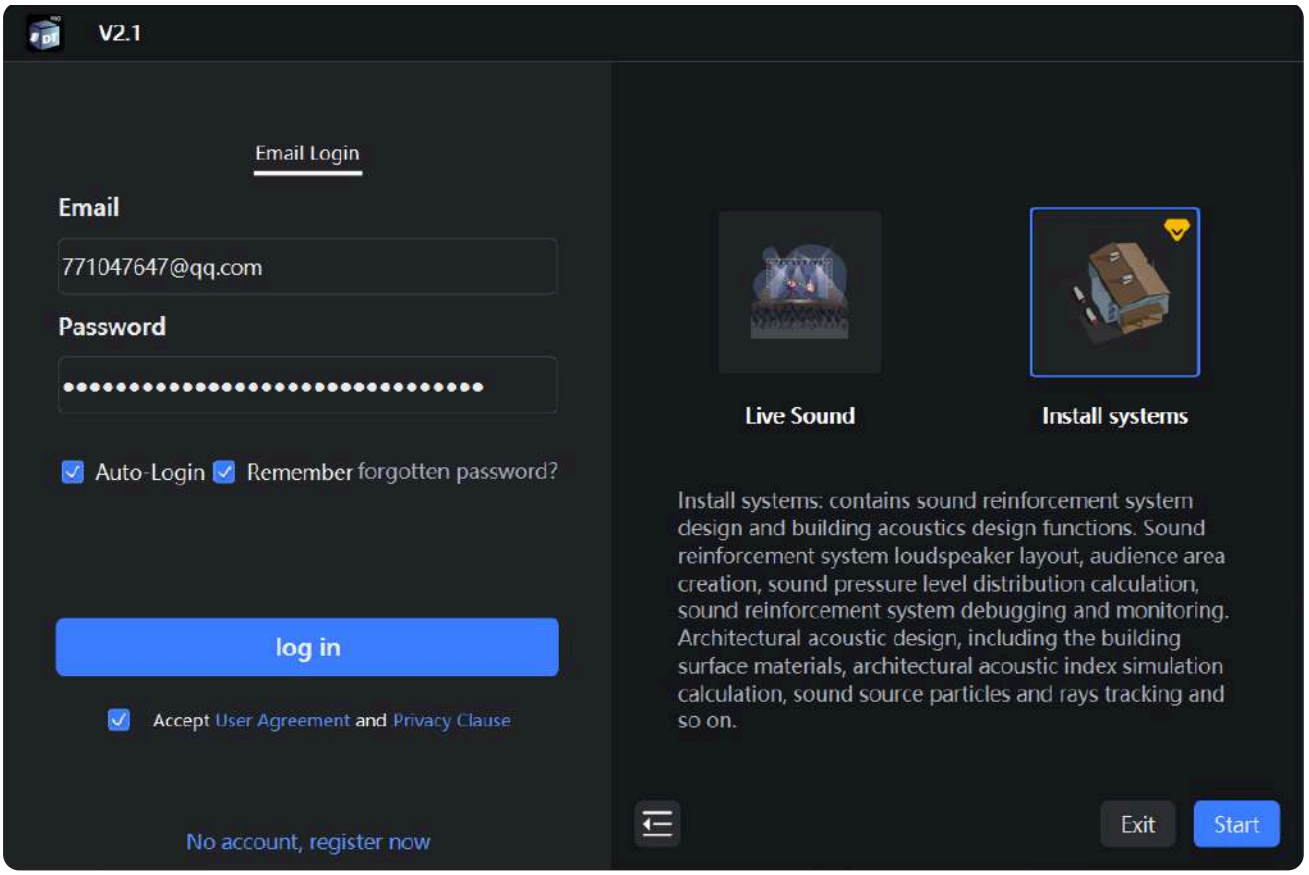


Figure 2-1 Account login for DT-PRO software

2.2 VIP Purchase

On the startup page, after logging in to your account, you'll see the remaining time for your VIP features. When your VIP membership expires, you'll lose access to some value-added features. You can click "Go to Purchase" to extend your VIP privileges.

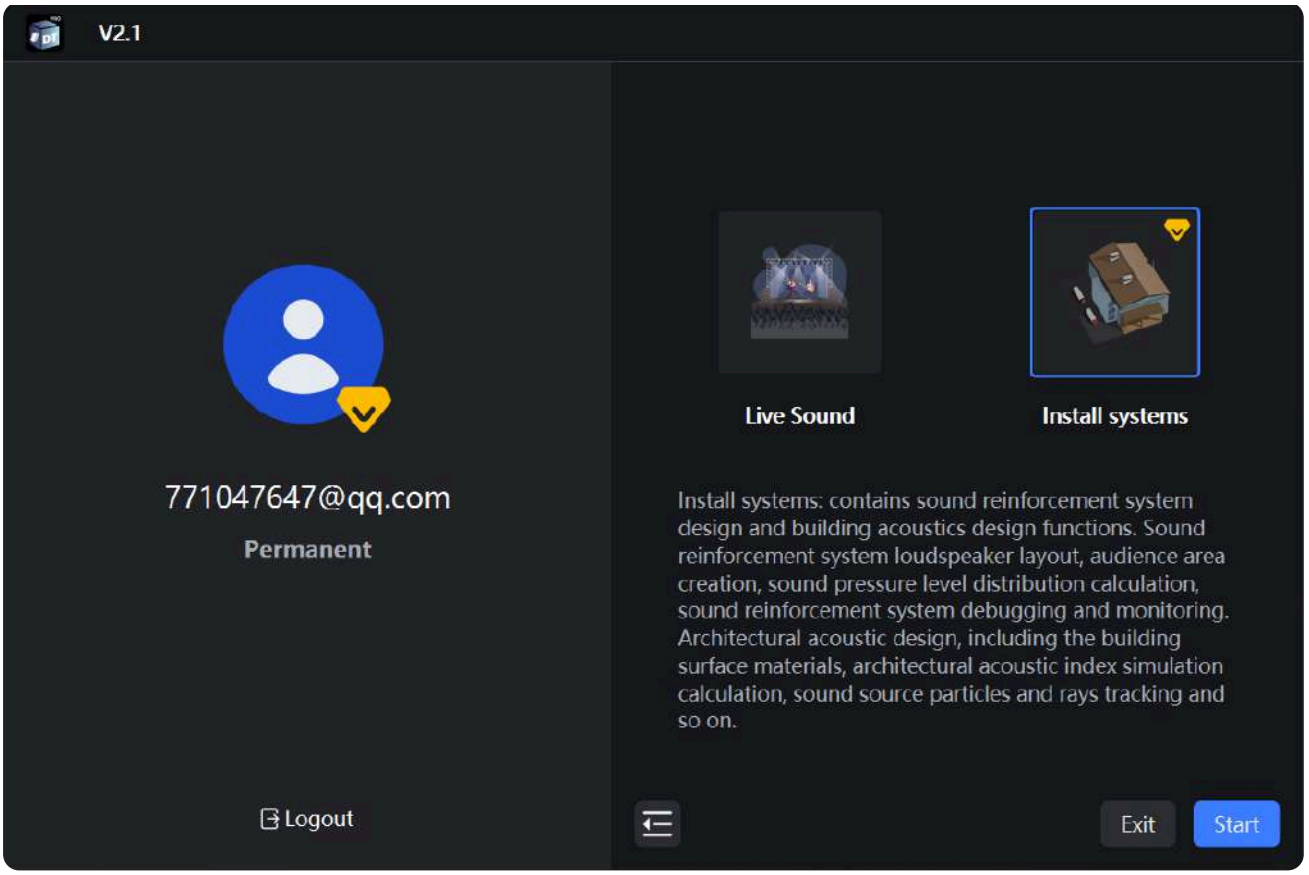


Figure 2-2 VIP purchase of DT-PRO software

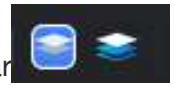
3. General Basic Functions

3.1 General Settings

3.1.1 3D View Interaction

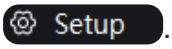
After selecting the software mode and entering the main program, the 3D view in the main program can be interacted with using the mouse for convenient viewing. The details are as follows:

Interaction	Operation
Rotate the view around the viewing angle	Hold down the right mouse button and slide the mouse
Zoom View	Scroll the mouse wheel
Drag viewport	Hold down the mouse wheel and slide the mouse
Select target	Select the object to copy and click the left mouse button

Quick view switching	Left click on the toolbar 
Model surface mode	Left click on the toolbar 
Material color display	Left click on the toolbar 
Sound source indicator	Left mouse click 
View navigation	Observe the lower left corner of the 3D view  to help determine the viewing direction

3.1.2 Global Settings

There are two ways to make global settings. One is to directly click the temperature and humidity control icon in the upper right corner to open the settings page 

. The other is to open the settings page by clicking the main menu  and then clicking it 

.

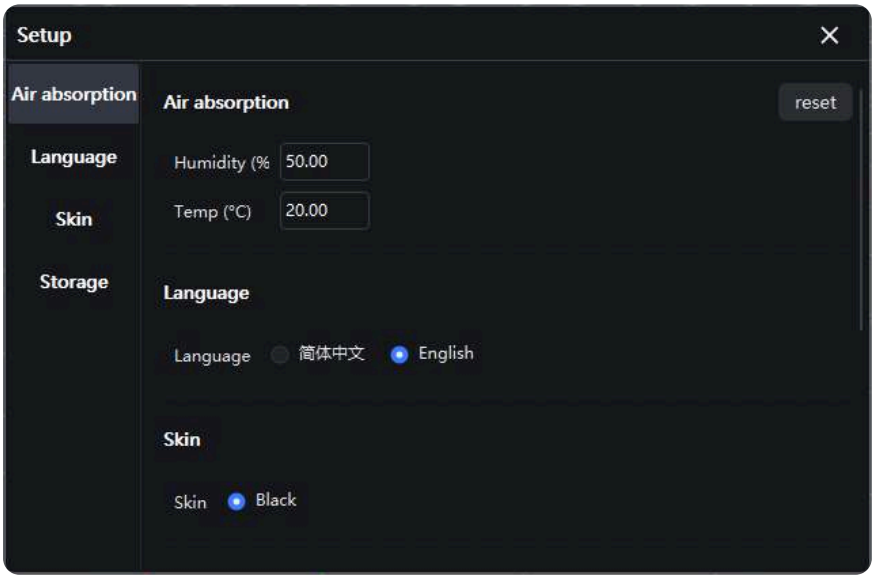
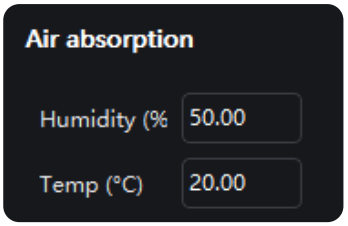
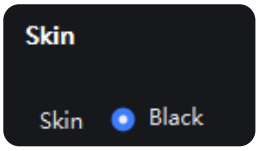
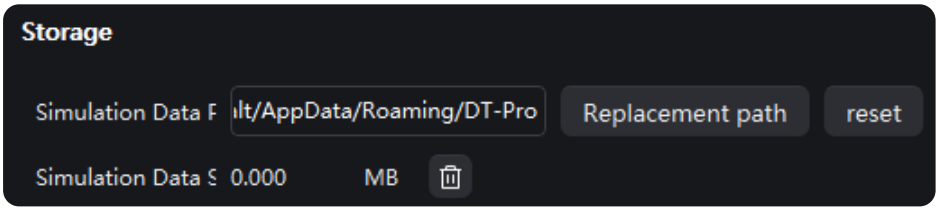


Figure 3-1 Global Settings

Setting content	

	After clicking on the env temperature and humidi
	Click to switch the syste
	Click to switch interface
	Clickto change the locat stored.Click to restore th project calculation result

3.2 Project Model Import

In Room Acoustics Simulation mode, you can begin the simulation design of a new project by importing a 3D model into the software.

3.2.1 3D Modeling

After surveying and measuring the project site, use modeling software to create a model based on the project's finished interior surfaces. The model should consist of single, independent surfaces, not components or groups. Otherwise, the model will not display properly when imported into the simulation software. After designing and estimating the sound-absorbing materials based on the project's requirements, group the model's surfaces into layers, including absorbers, walls, floors, ceilings, windows, etc. This will facilitate batch modification of identical surface materials after importing into the software.

After ensuring that the model fully reflects the site conditions, export the file in the appropriate format. Currently, the software supports importing 3D model files in *.stl, *.skp, and *.dxf formats.

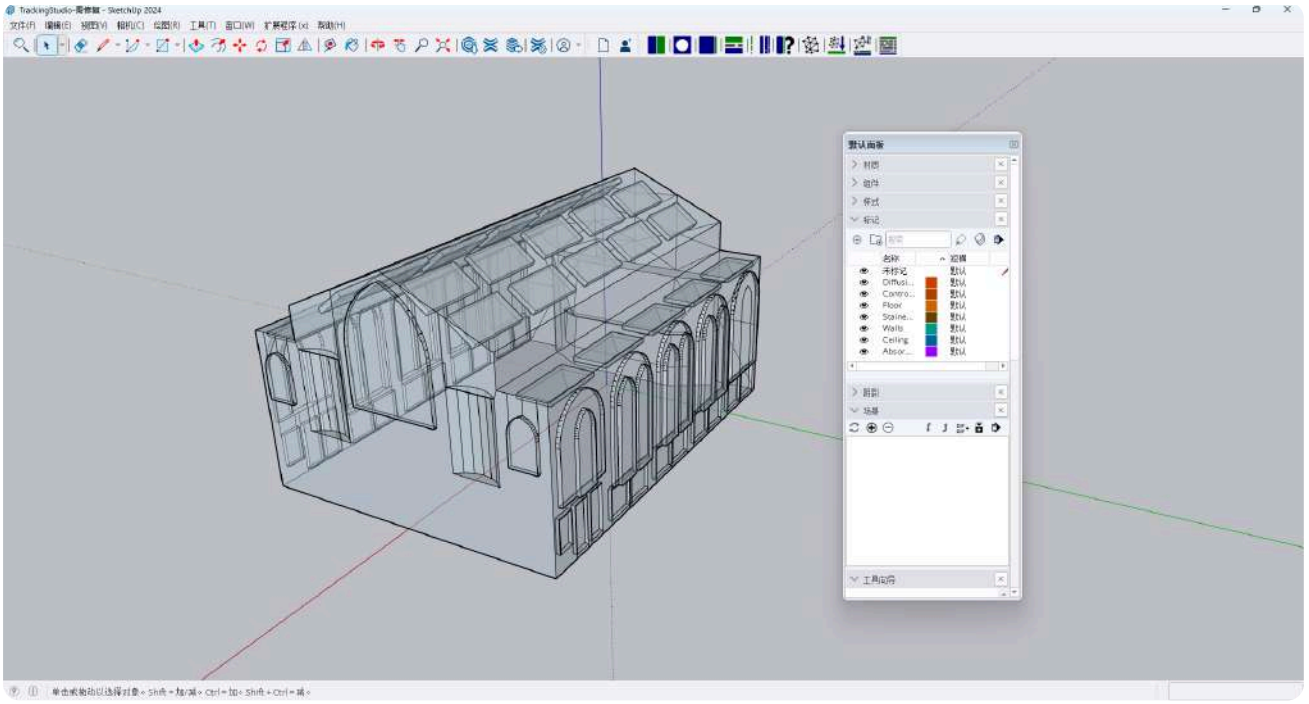
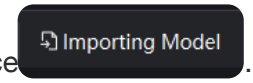


Figure 3-2 Creating a building model in Sketchup

3.2.2 Importing model files (indoor simulation)

Import the 3D model you need by clicking the toolbar on the main interface 

. Instructions for importing the model will be provided to help you import the correct model. After importing, the model will be displayed in the 3D view area.

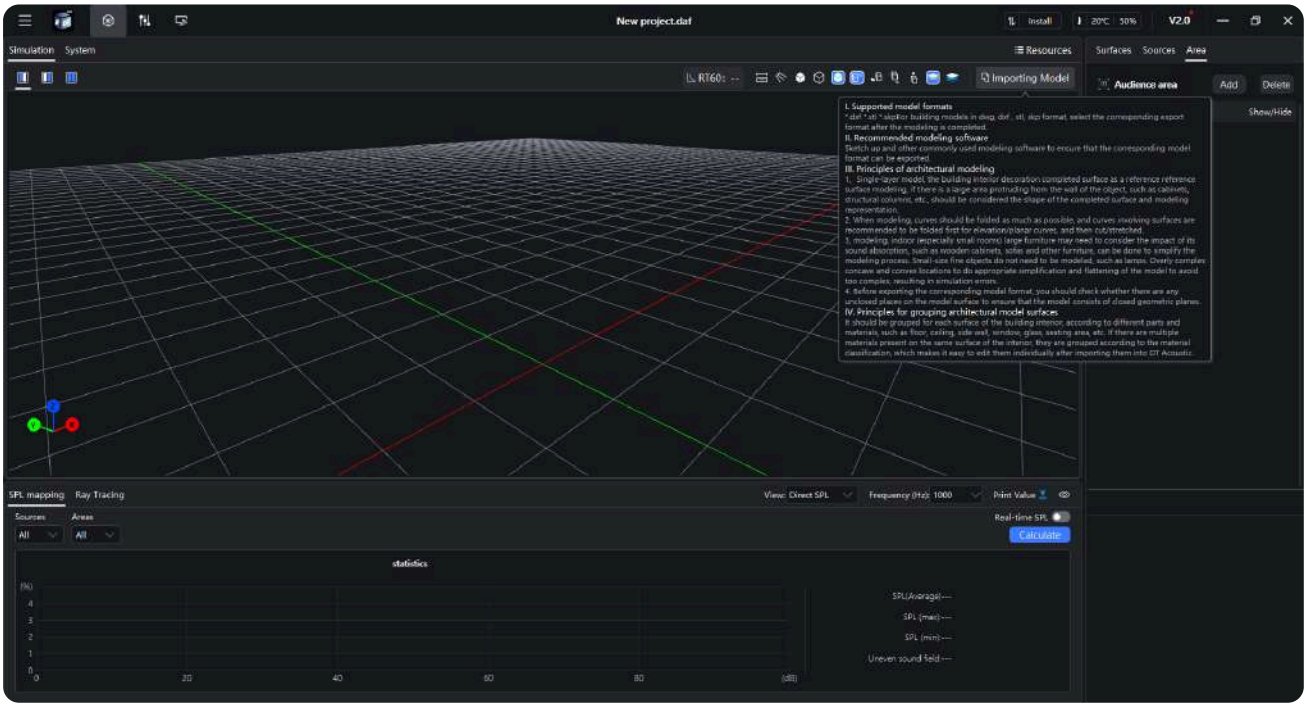


Figure 3-3 Importing a building model into DT-PRO software

3.2.3 Confirmation Model

After importing, the model will be displayed in the 3D viewport. Please check that the model surface is complete and that the grouping information is consistent with the model before proceeding to the next step.

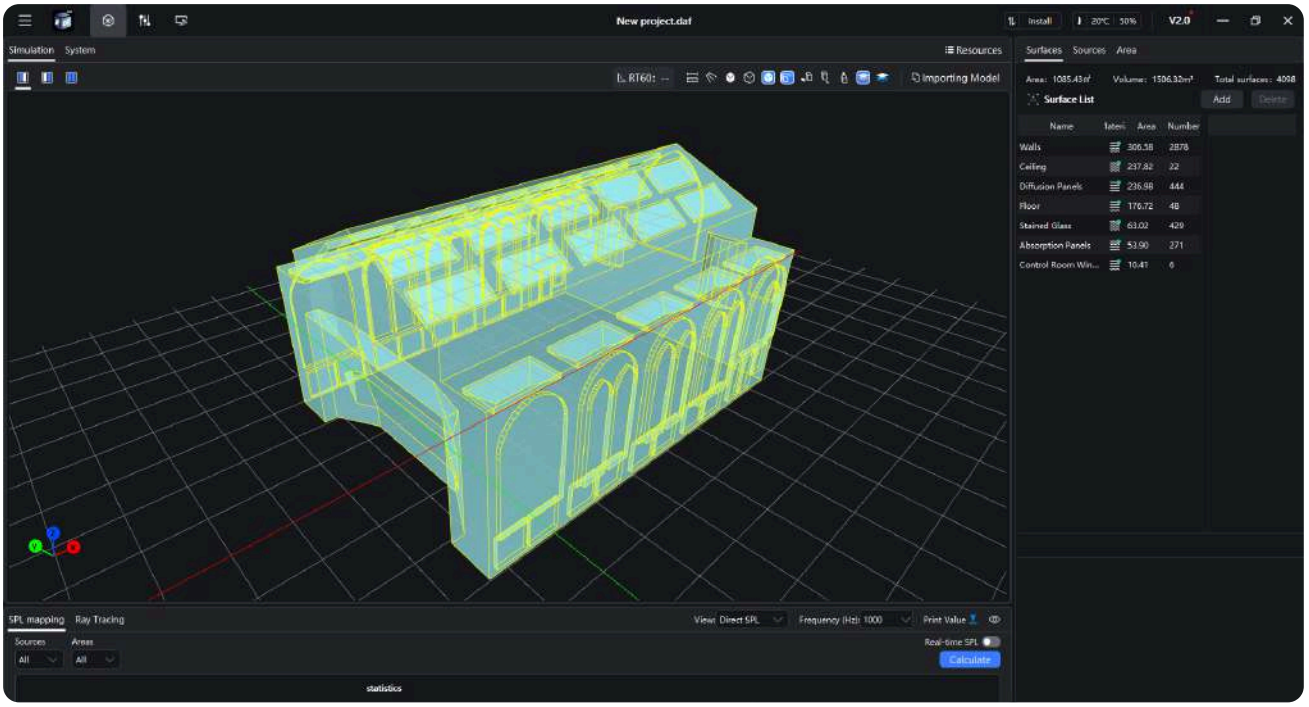


Figure 3-4 Importing a building model into DT-PRO software

3.3 Model material matching

When we want to view the materials in the current system, we can enter the material library by clicking on the material group, or we can click [Resource Management] - [Material Library] to enter the material library to view all materials. There are five material lists in the material library. You can view the required materials in different lists according to your needs.

List name	List function
Materials in Use Currently being used	Contains all materials selected and applied to the current project model.
Material list (ideal material) Ideal materials	Includes materials with sound absorption coefficients ranging from 0% to 100%, useful for testing or quickly estimating design results.
Material list (Absorbent Materials) Sound-absorbing materials	Includes various built-in sound absorption materials for reducing reverberation time.
Material List (Building Materials) Common surface materials	Includes various common interior surface materials for recreating actual project interior surfaces.

Material list (customized/imported) Custom/Import	Includes all user-created or batch-imported materials.

3.3.1 Matching Grouped Materials

Click the icon  next to each group to open the material library and match the surface groups and sound-absorbing materials to the corresponding materials. You can quickly search for the corresponding material directly in the search bar, or browse through the material list to select the sound-absorbing material you need for the renovation and commonly used surface materials that match your actual needs.

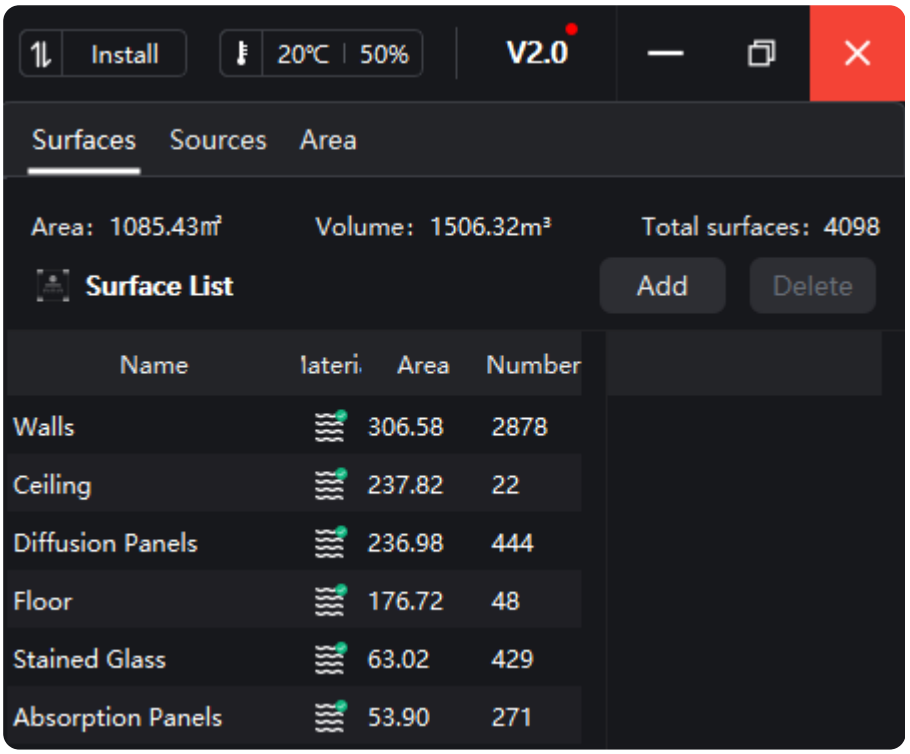


Figure 3-5 Surface grouping

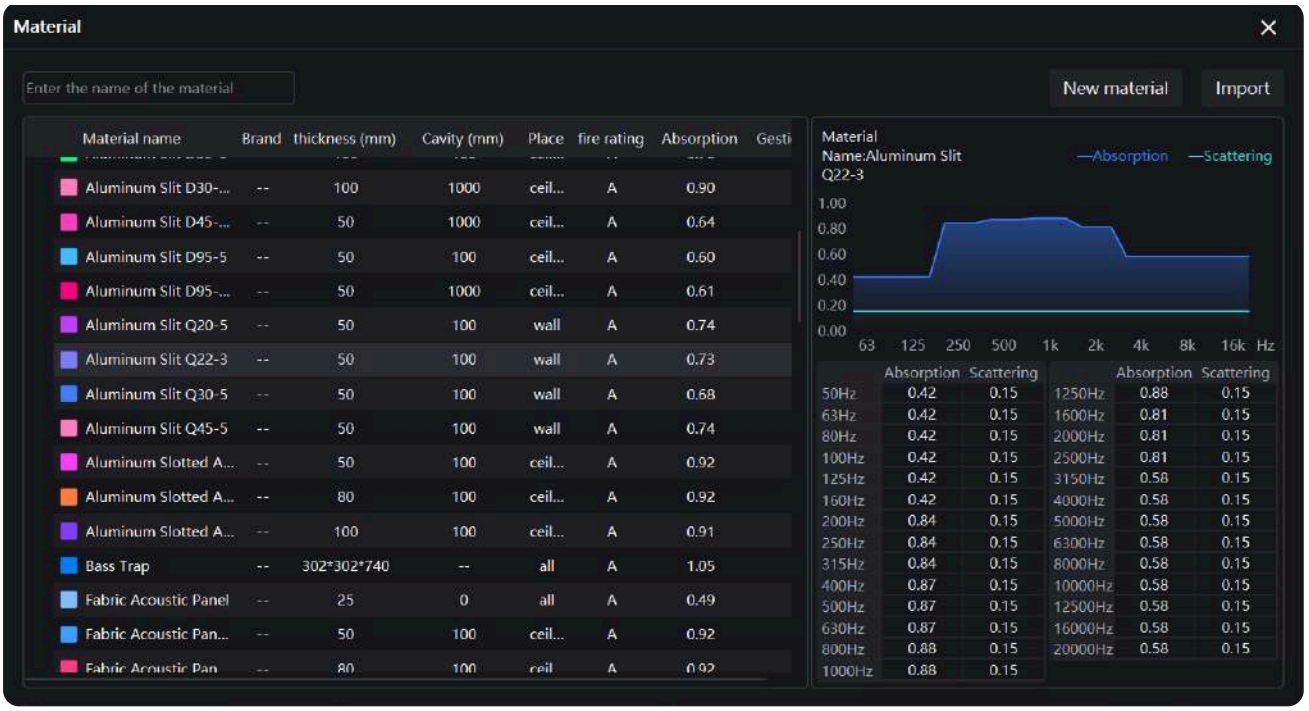


Figure 3-6 Selecting acoustic material in the material library

3.3.2 Add/Import Materials

If the system's built-in material list does not have the material you want to use, you can click [Resource Management] - [Material Library] in the upper right corner to create a new material or import a material.

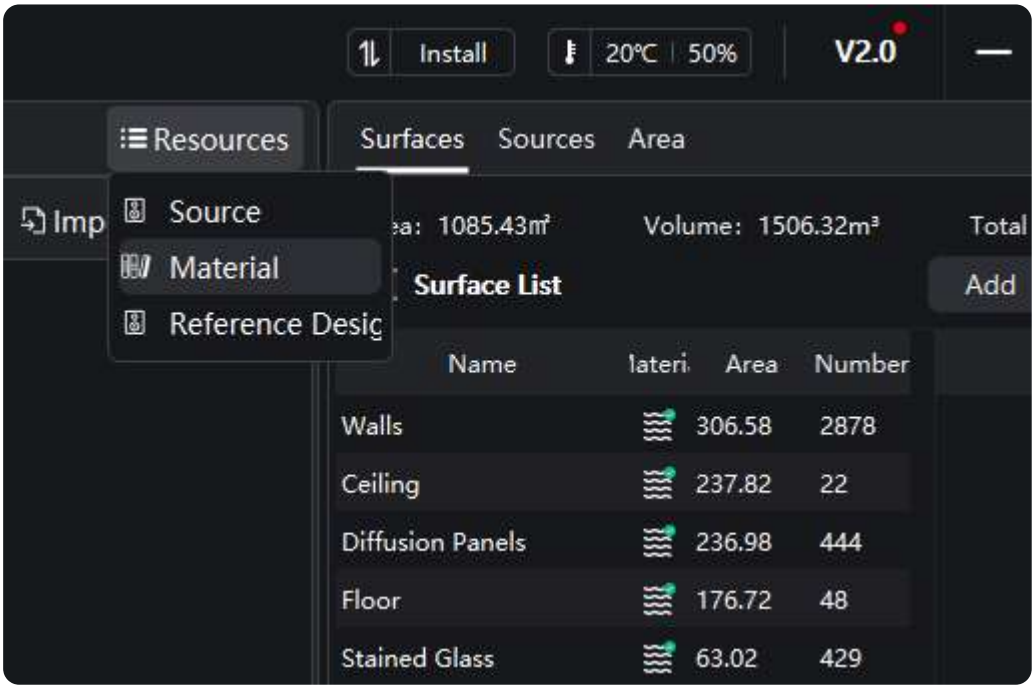


Figure 3-7 Click Resource Management to pop up the Material Library

Figure 3-8 Create or import materials in the material library through the upper right corner

After creating/importing, you can confirm whether the material is created successfully in the custom/import list in the material library and match the corresponding group materials.

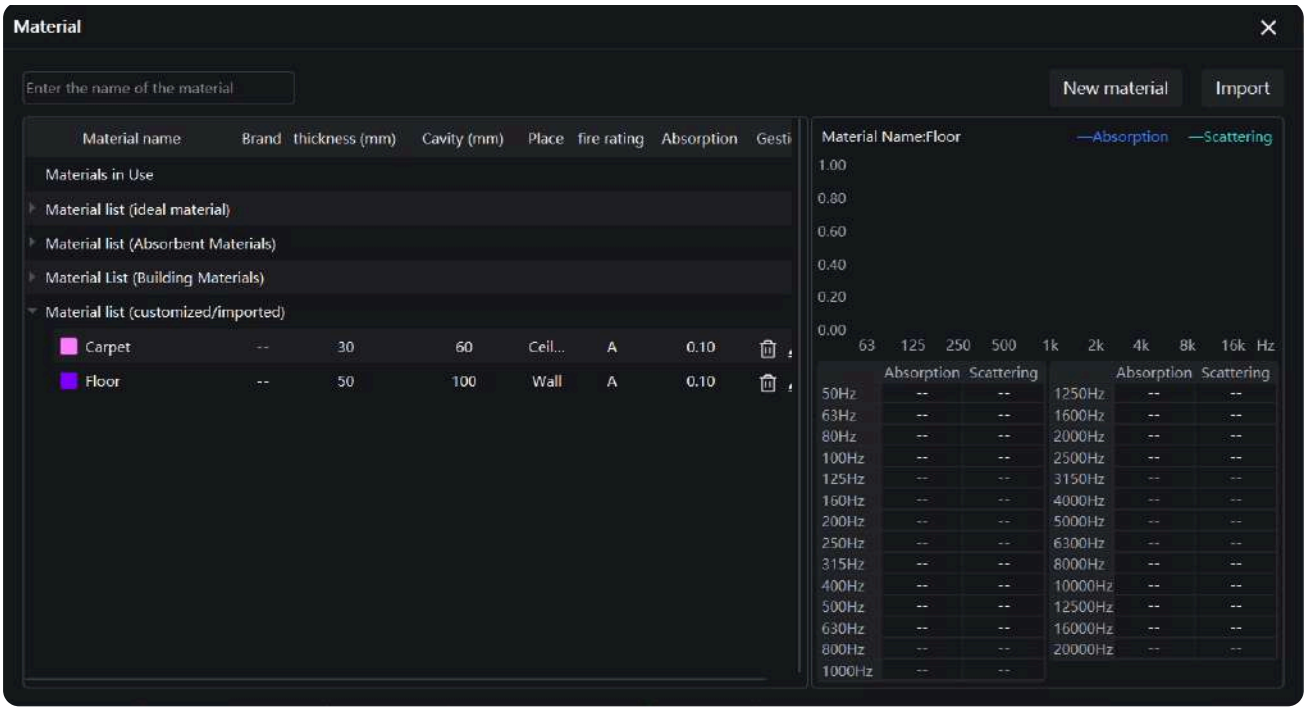


Figure 3-9-1 Material library management material list (custom/import)

3.3.3 Modify the material

If you want to edit the sound absorption coefficient of your custom material, you can click [Resource Management] - [Material Library] in the upper right corner to enter the material library and come to the custom material list. After selecting a material, click the operation icon on the right side of the material to enter the editing page. You can modify the value for each specific frequency band. After the modification is completed, click [Save] to successfully modify it.

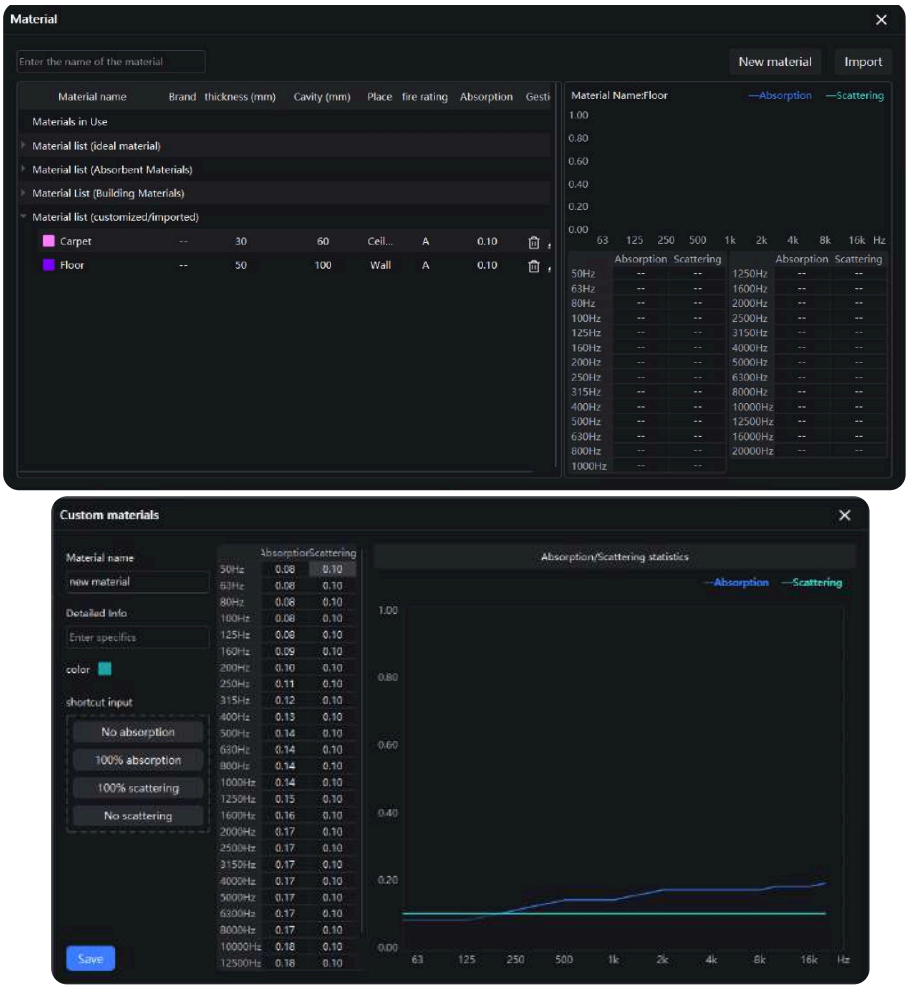


Figure 3-9-2 Material Library Management Material List (Custom/Import)

3.4 audience listening area creation

3.4.1 Adding a audience listening area

In the audience listening area tab, in the target editing area on the right side of the DT-PRO software, you can add various audience listening area types, which will be displayed simultaneously in the 3D view. You can select a audience listening area and make the necessary edits. By adding and editing multiple audience listening areas, you can create audience listening areas of various shapes. The audience listening area is used to render the direct sound pressure level distribution of the loudspeaker's sound radiating to it. When creating and editing a audience listening area, it is recommended to set the height of the audience listening area to the audience's listening height.

In mobile performance mode, the software provides a variety of built-in audience listening area models, including rectangles, polygons, isosceles trapezoids, sector-shaped stands, and stepped stands. You can also draw the audience listening area directly in the diagram using the freehand drawing method. When drawing the audience listening area in a freehand manner, the default Z-axis position is 1.2 meters.

In indoor simulation mode, the software retains the method for adding audience listening area models related to mobile performances, and also provides a mapping surface/mapped surface grouping audience listening area function. With this method, you can click on the building surface in the image to quickly generate a audience listening area that matches its shape.

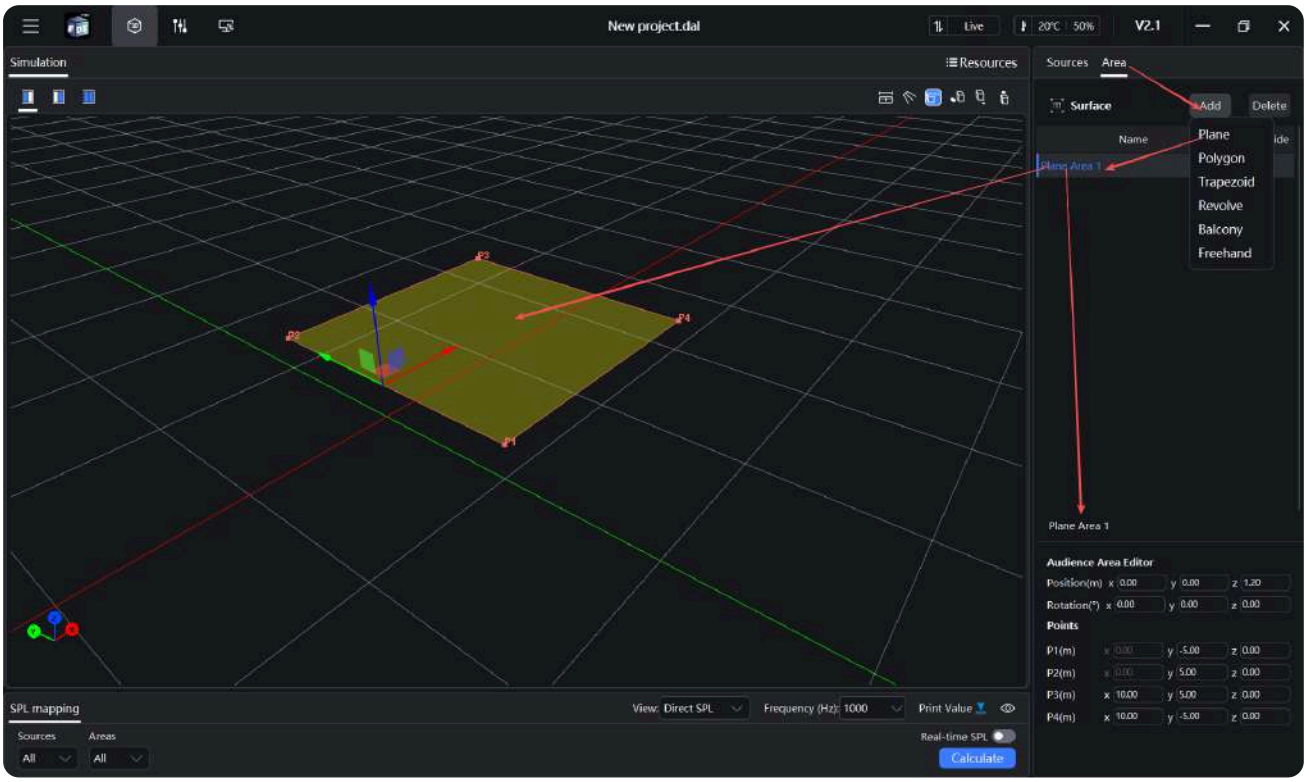


Figure 3-10 Creating a audience listening area in Live Sound mode

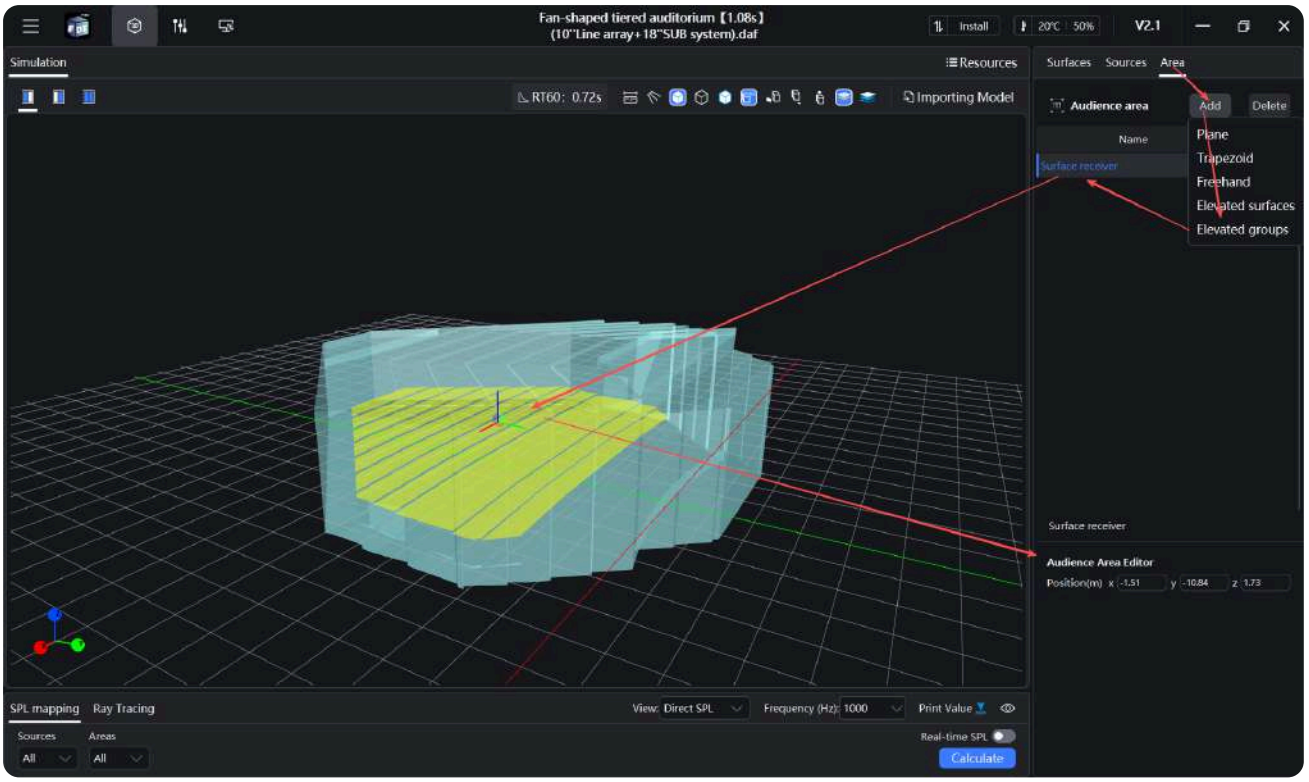
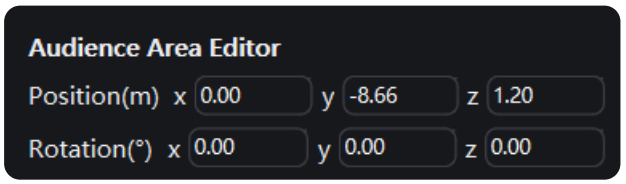
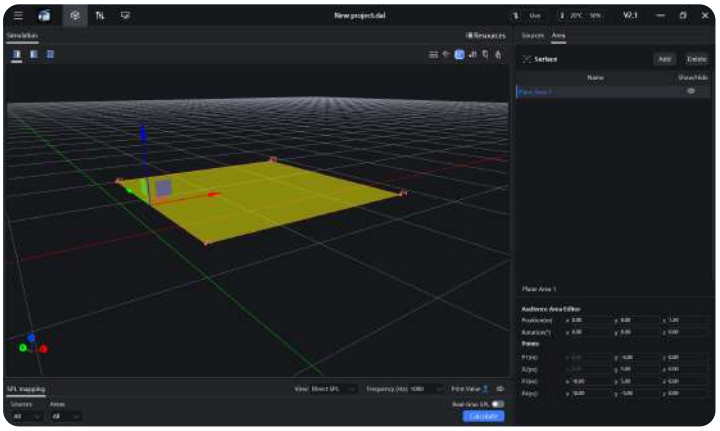
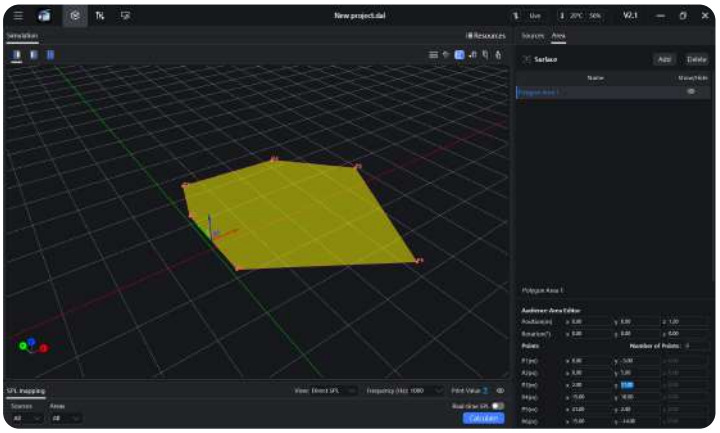


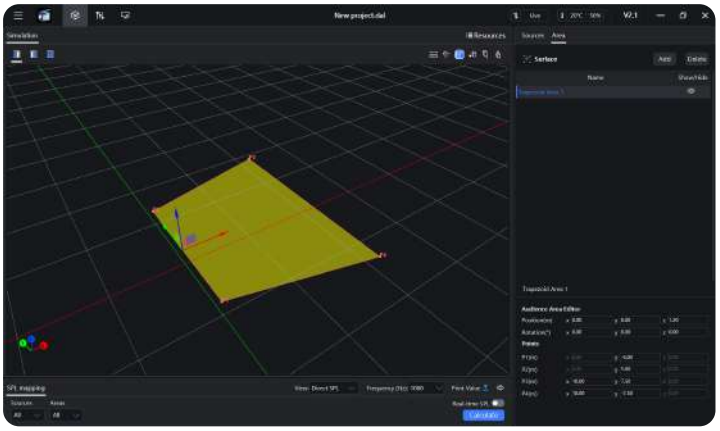
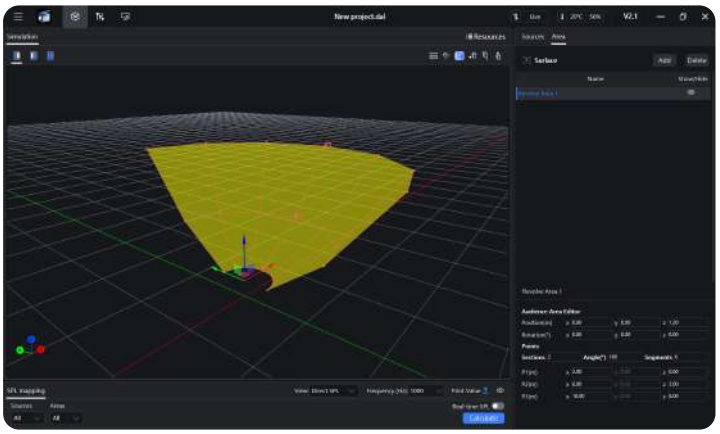
Figure 3-11 Creating a audience listening area in Install systems mode

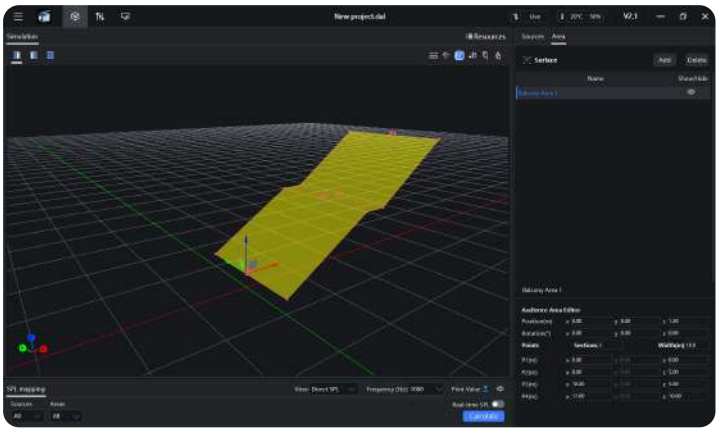
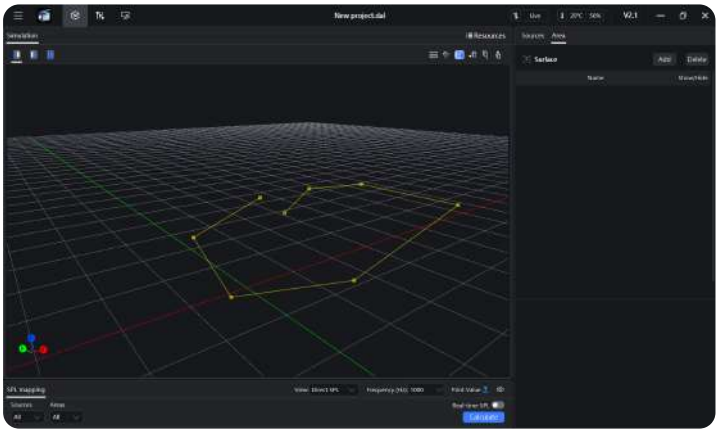
3.4.2 Editing the audience listening area

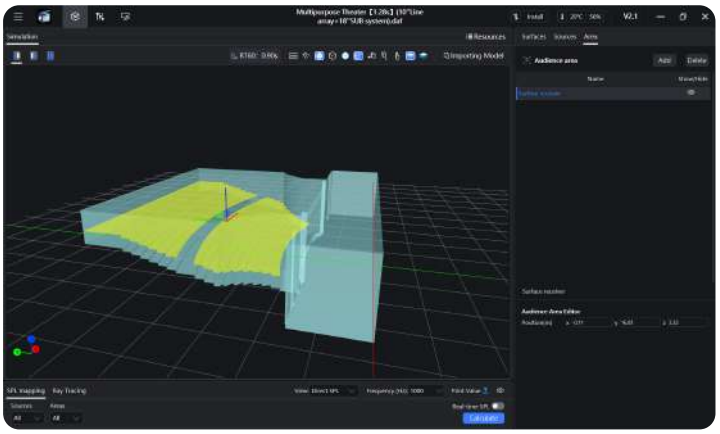
In the Diting Acoustic Simulation Measurement Software, different audience listening area types have different editing interaction logics. The following will introduce the editing logic of each audience listening area type.

audience listening area Type	audience area Properties	Description
 Figure 3-12 General properties of the audience listening area	Base point coordinates	Used to determine the position of the entire audience listening area. When the base point coordinates are modified, the audience listening area will move as a whole. When the audience listening area is selected, the polar coordinate position within the audience listening area in

		the figure is the current audience listening area base point.
	Rotation angle	Used to rotate the entire audience listening area along the base coordinate axis. You can choose to rotate along the x, y, and z axes of the base coordinate axis to create a sloped audience listening area.
 Figure 3-13 Rectangular audience listening area	Vertex coordinates	The vertex coordinates are relative to the base point of the current audience listening area. Modifying the vertex coordinates can change the size of the audience listening area. In a rectangular audience listening area, the modification of the vertex coordinates will follow a certain linkage mechanism to ensure that the audience listening area is rectangular.
 Figure 3-14 Polygonal audience listening area	Number of vertices	Polygonal audience listening area, the number of vertices can be set from 3 to 20. The polygonal audience listening area is formed by connecting all vertices end to end in sequence.
	Vertex coordinates	The vertex coordinates are coordinate values relative to the base point of the current audience listening area. Modifying the vertex coordinates can change the

		size and shape of the audience listening area.
 Figure 3-15 Isosceles trapezoidal audience listening area	Vertex coordinates	The vertex coordinates are the coordinate values relative to the base point of the current audience listening area. Modifying the vertex coordinates can change the size of the audience listening area. In an isosceles trapezoidal audience listening area, the modification of the vertex coordinates will follow a certain linkage mechanism to ensure that the audience listening area is an isosceles trapezoidal shape.
 Figure 3-16 Fan-shaped stand audience listening area	Number of layers	The number of levels of the fan-shaped stand audience listening area can be set by the number of layers.
	Coverage	Used to set the total coverage angle of the audience listening area of the stand along the x direction of the base point coordinate to both sides.
	Segments	Used to set the number of coverage areas the stands are divided into. The more segments there are, the closer the stands are to an arc.
	Vertex coordinates	Set the starting point/end point of each level of stands. The starting point of the second level of

		stands is the end point of the first level of stands.
 Figure 3-17 audience listening area of the stepped stands	Degree	The number of steps can be set for the audience listening area of the stepped stands.
	Width	Used to set the total width of the audience listening area of the stand along the base point coordinate x direction to both sides.
	Vertex coordinates	Set the starting point/end point of each level of stands. The starting point of the second level of stands is the end point of the first level of stands.
 Figure 3-18 Freely draw the audience listening area	Freehand drawing of audience listening area attributes	A freely drawn audience listening area is a polygonal audience listening area. The starting point of the free drawing is the base point of the audience listening area. Modifying the base point coordinates will move the audience listening area as a whole. When a audience listening area is selected, the polar coordinate position within the audience listening area in the image is the current base point of the audience listening area.
	Lock X-axis drawing	During free drawing, hold down the X key on the keyboard to lock the X coordinate of the next drawing point to be

		consistent with the previous point.
	Lock Y-axis drawing	During free drawing, press and hold the Y key on the keyboard to lock the Y coordinate of the next drawing point to be consistent with the previous point.
 Figure 3-19 Surface/surface group mapping audience listening area	Base point coordinates	The audience listening area generated by surface or surface group mapping only supports the movement of the entire audience listening area, that is, modifying the base point coordinates.

3.4.3 Drag the audience listening area

In the Diting Acoustic Simulation Measurement software, select the audience listening area and quickly drag the audience listening area's base coordinate axis. The detailed interaction is as follows.

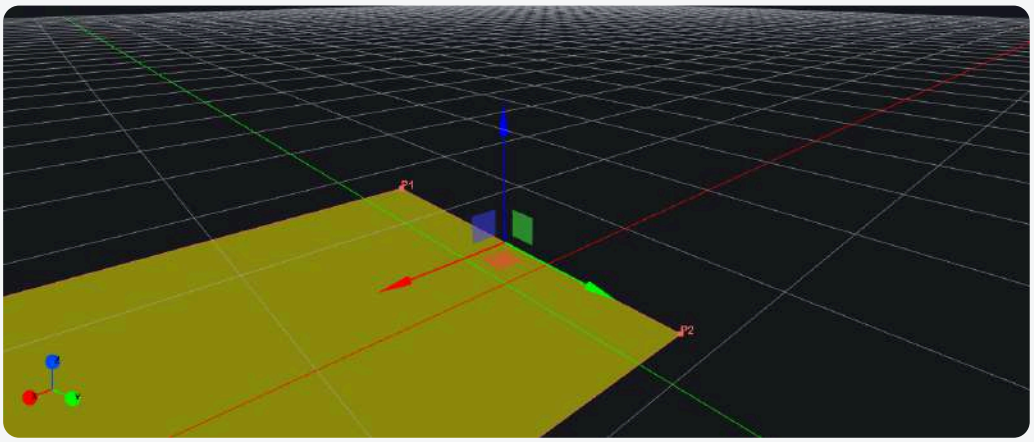


Figure 3-20 Drag controls on the audience listening area

Drag the coordinate axis	Move the audience listening area along the coordinate axis.
Drag the coordinate plane	Move the audience listening area along the XY plane/YZ plane/XZ plane where the current base point is located.

3.5 Importing and Editing Sound Sources

3.5.1 Sound Source Library

In the Resource Management module of the DT-PRO Software main program, select the Sound Source Library to access all built-in speakers and externally imported speaker data files. The software supports recognition of speaker files in *.dtl format.

Figure 3-21 Source Library Entry

3.5.2 Import audio source files

You can view all built-in speakers and externally imported speaker data files in the Sound Source Library. DT-PRO Software supports recognition of speaker files in *.dtl format. Imported sound sources will be displayed as a list within the Sound Source Library.

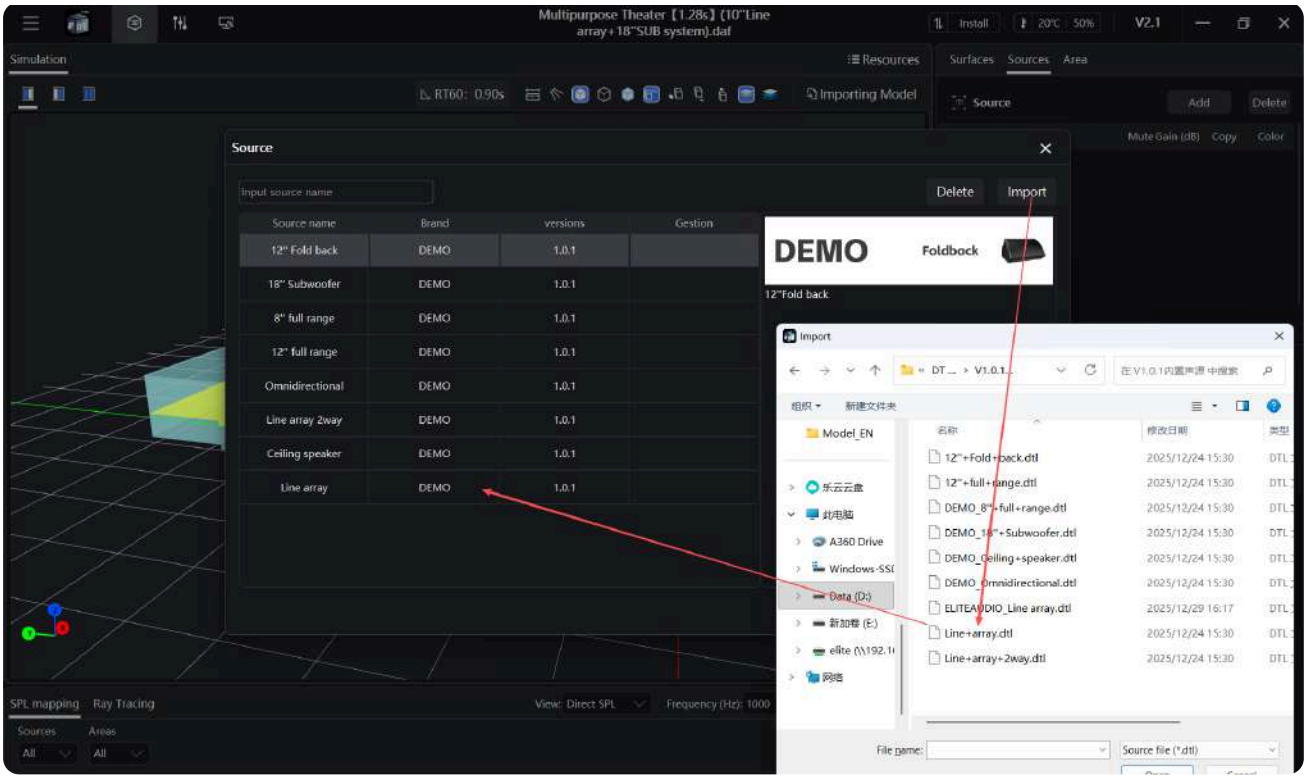


Figure 3-22 Importing Source Files

3.5.3 Add sources to the venue

You can access the sound source library by clicking “Add Sound Source” in the Sound Source tab of the target editing area on the right side of the software. From there, you can select individual speaker series to add to your venue.

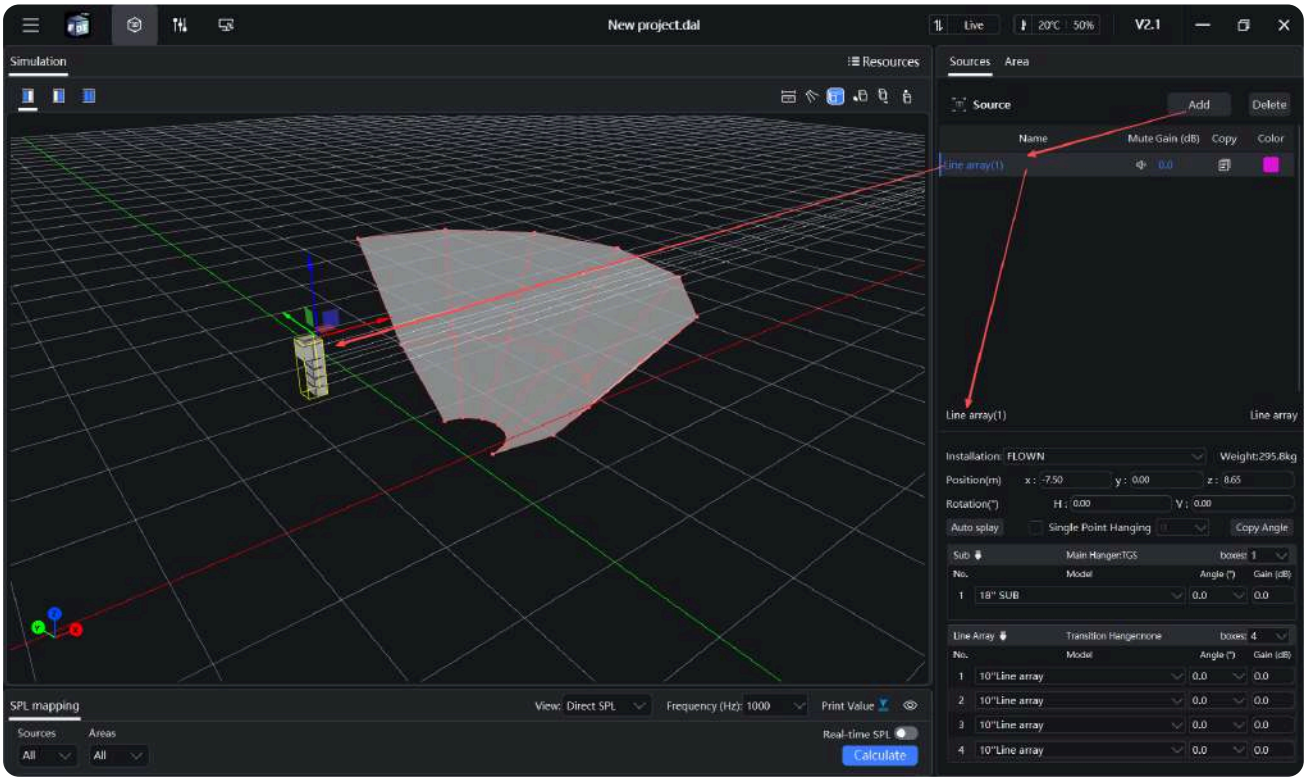


Figure 3-23 Add sources to the venue

3.5.4 Moving source

You can move a sound source within the 3D view by selecting it in the sound source list or 3D diagram, dragging its base point coordinate axes and coordinate plane, or modifying its position coordinates.

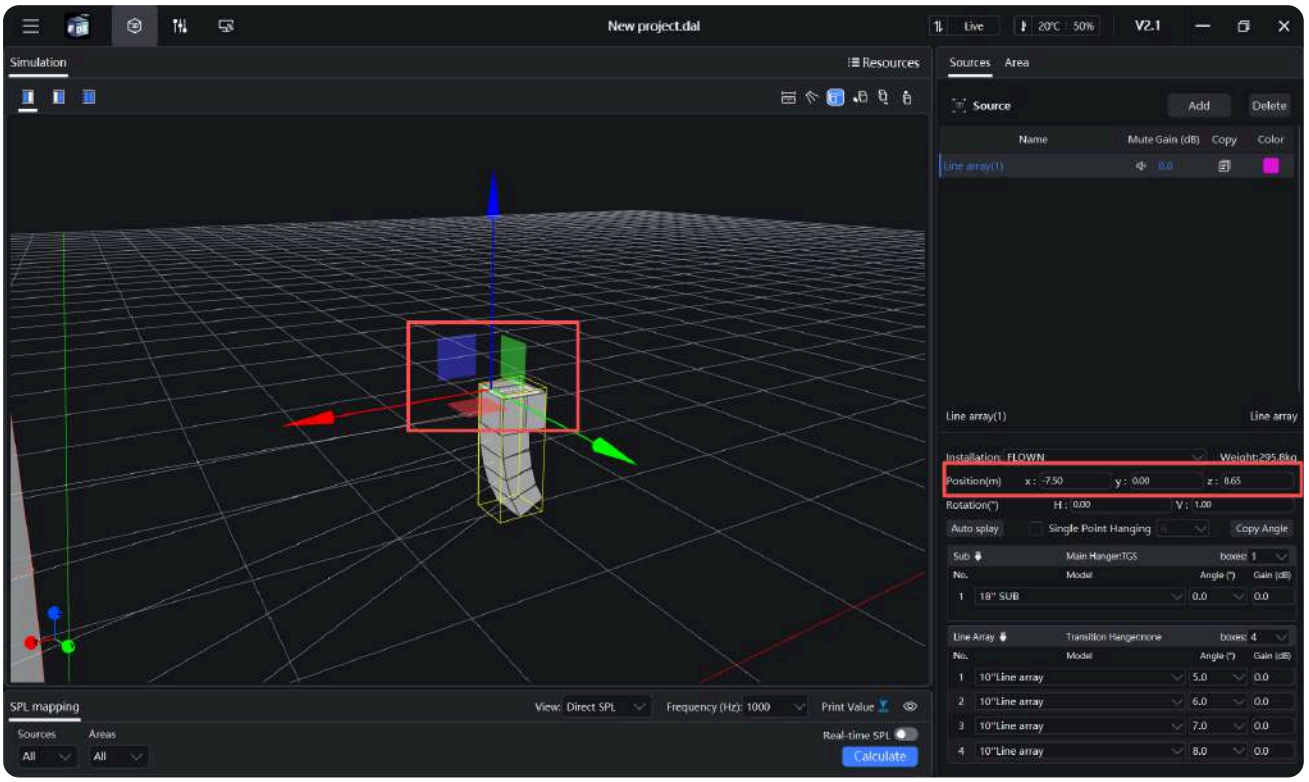


Figure 3-24 Moving source

3.5.5 Basic Properties of Sources

You can adjust the direction of a sound source by selecting it in the sound source list or 3D diagram and modifying its rotation properties. The selected sound source will display a white ray indicating the orientation of its speaker unit. Click the “  ” button in the 3D view toolbar to display orientation rays for all sound sources. Additionally, you can switch views to display a side installation view of the selected sound source. Double-click the sound source name to rename the current sound source.

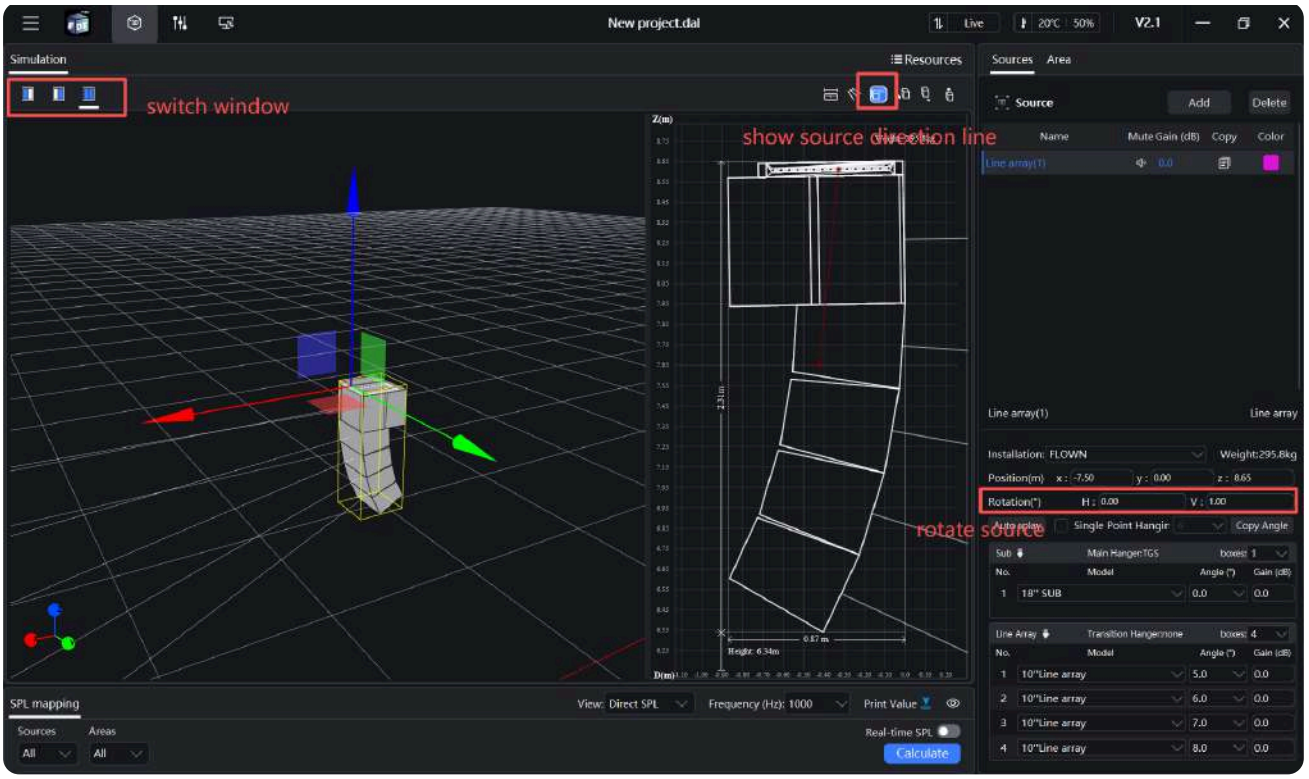


Figure 3-25: Sound Source Basic Properties, Window Switching, and Ray Direction Display Tool

3.5.6 Line Array Editing

3.5.6.1 Line Array Installation Method

When editing line array speakers, you can choose different installation methods for the line array. Installation method options are defined by the sound source file, typically offering suspended installation systems and stacked installation systems.

Suspension System: Speakers are mounted vertically from top to bottom. By adjusting the number and tilt angle of each speaker, coverage is achieved across the primary audience area.	Stacking System: Speakers are mounted from bottom to top, with the number and tilt angle of each speaker adjusted to cover the primary audience area.

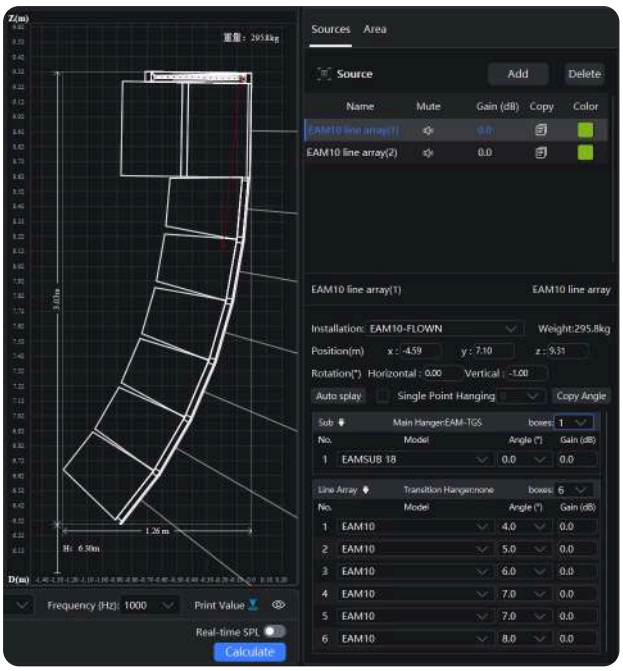


Figure 3-26 Line Array Suspension System

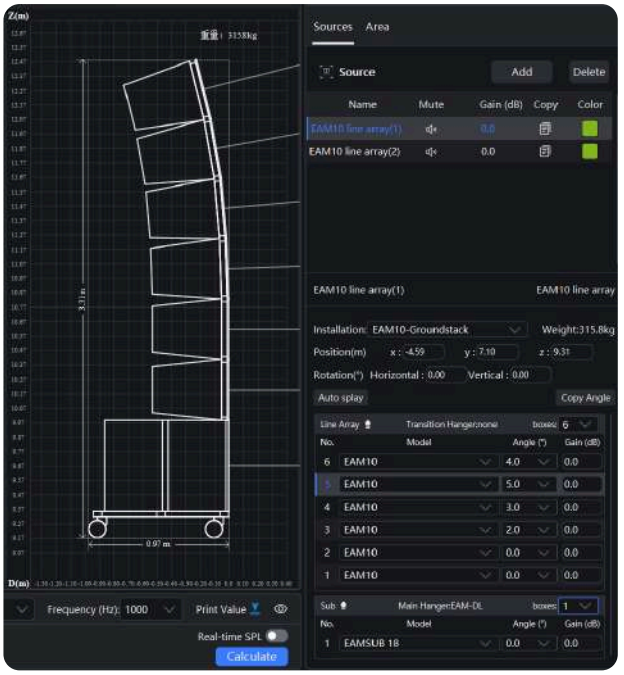


Figure 3-27 Line Array Stacking System

Single Point Hanging: When Single Point Hanging is selected, the line array system automatically calculates the tilt angle of the array during natural suspension based on the current suspension point and the array's center of gravity. When modifying the vertical tilt angle, the software automatically determines the closest single-point suspension hole position to achieve that tilt angle.

3.5.6.2 Auto splay

In line array editing, you can click “Auto Spay.” By specifying the line array speakers to be included in the calculation and the target audience area to be covered, the software will automatically calculate the recommended interconnection bend angles for each speaker in the current line array. This ensures axial uniform coverage of the target audience area.

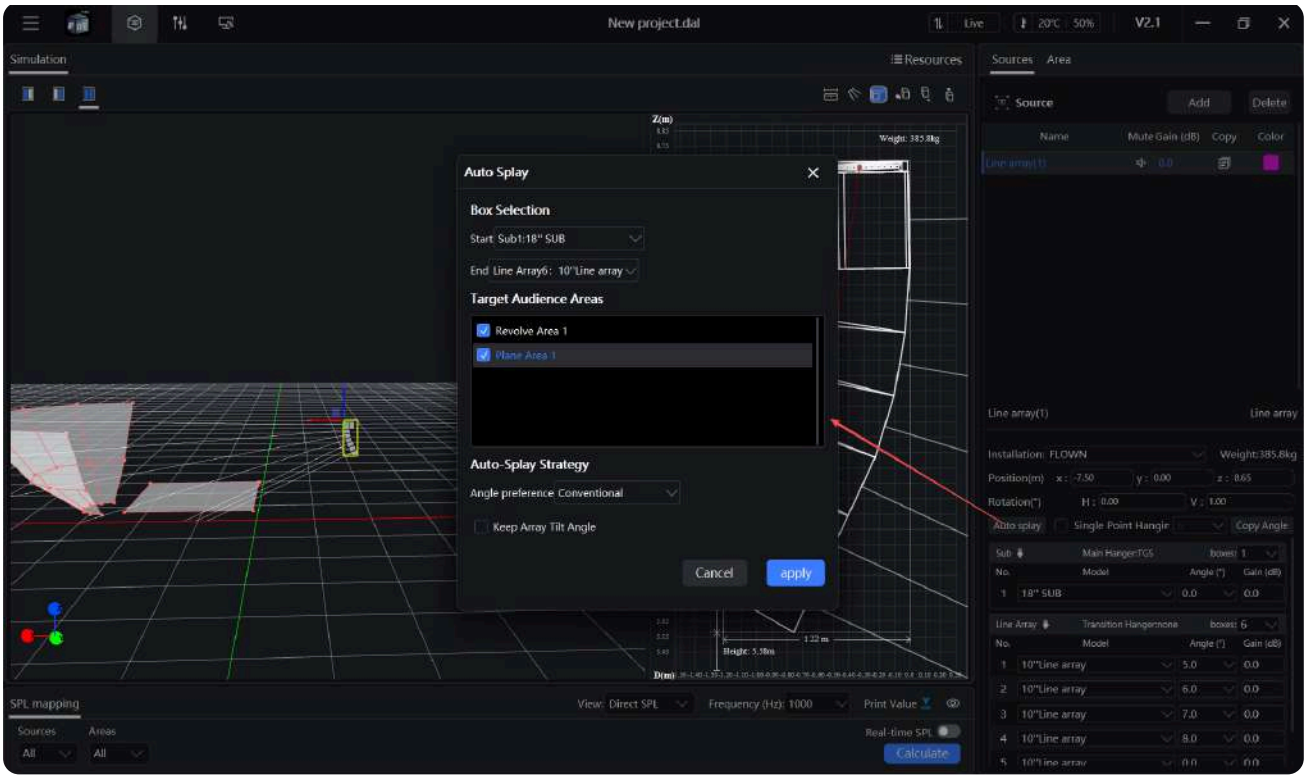


Figure 3-28 Auto splay

3.5.6.3 Copy Installation Configuration

If your project includes multiple line arrays of the same model, you can use the copy installation configuration feature to quickly replicate the current line array's installation properties to other selected line arrays of the same model. This operation only copies the installation properties of the line array and does not alter the fundamental source properties (gain/reference point coordinates/rotation angle).

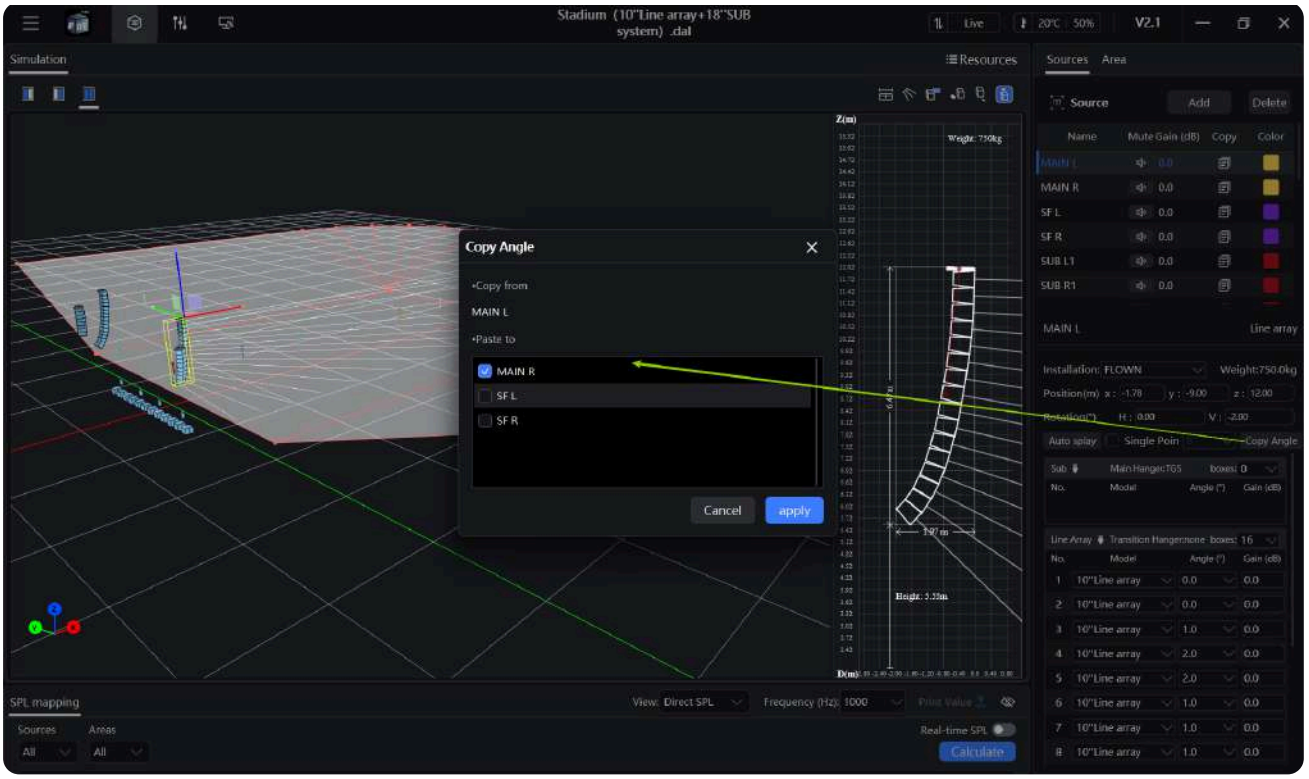


Figure 3-29 Reproduced Line Array Installation Configuration

3.5.7 Copy Source

You can access the sound source copy dialog by clicking “  ” in the sound source list. Here, you can add a sound source with identical properties to the current one, either at the same coordinates or at symmetrical coordinates.

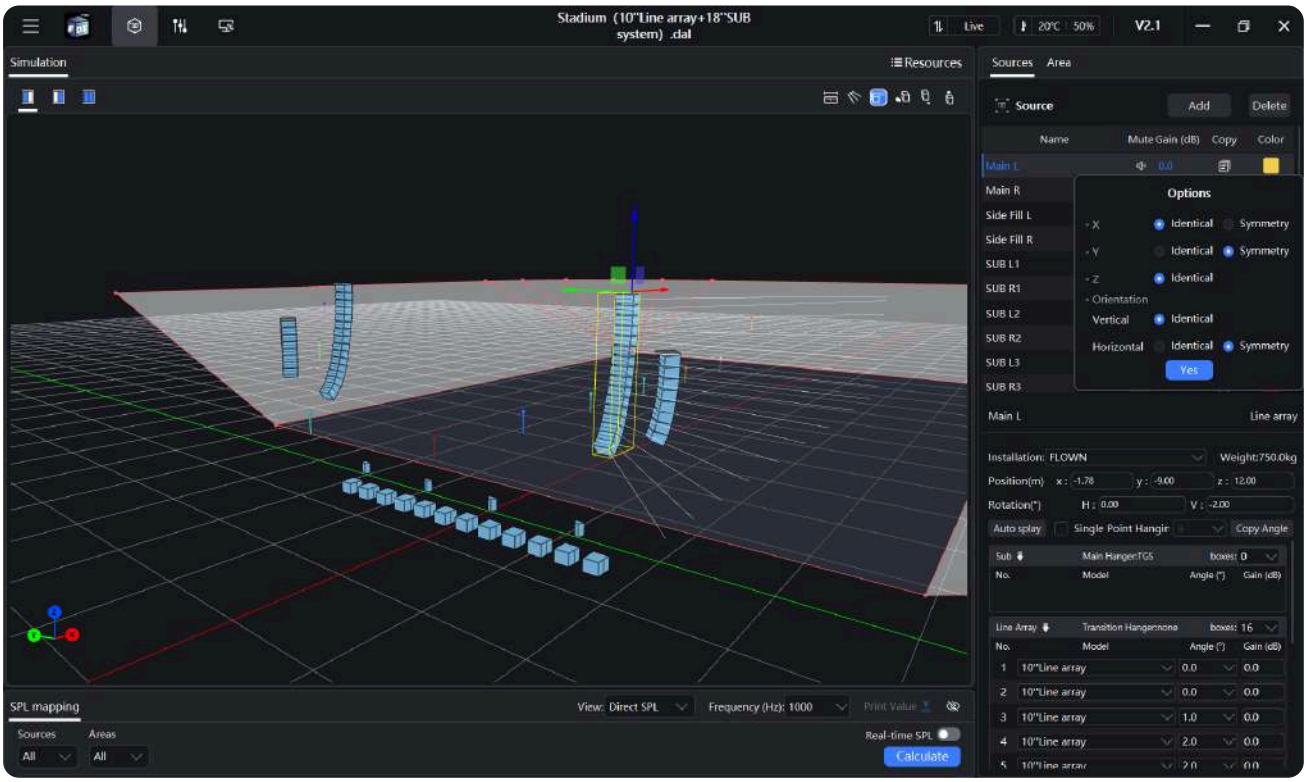


Figure 3-30 Copy Source

3.6 Simulation Results Display

3.6.1 Marking Simulation Results

In the sound pressure level distribution and ray tracing calculation areas, click to enter the Marking mode. In this mode, click the distribution graph to mark the specific simulation result at that point. Press the ESC key to exit Marking mode.

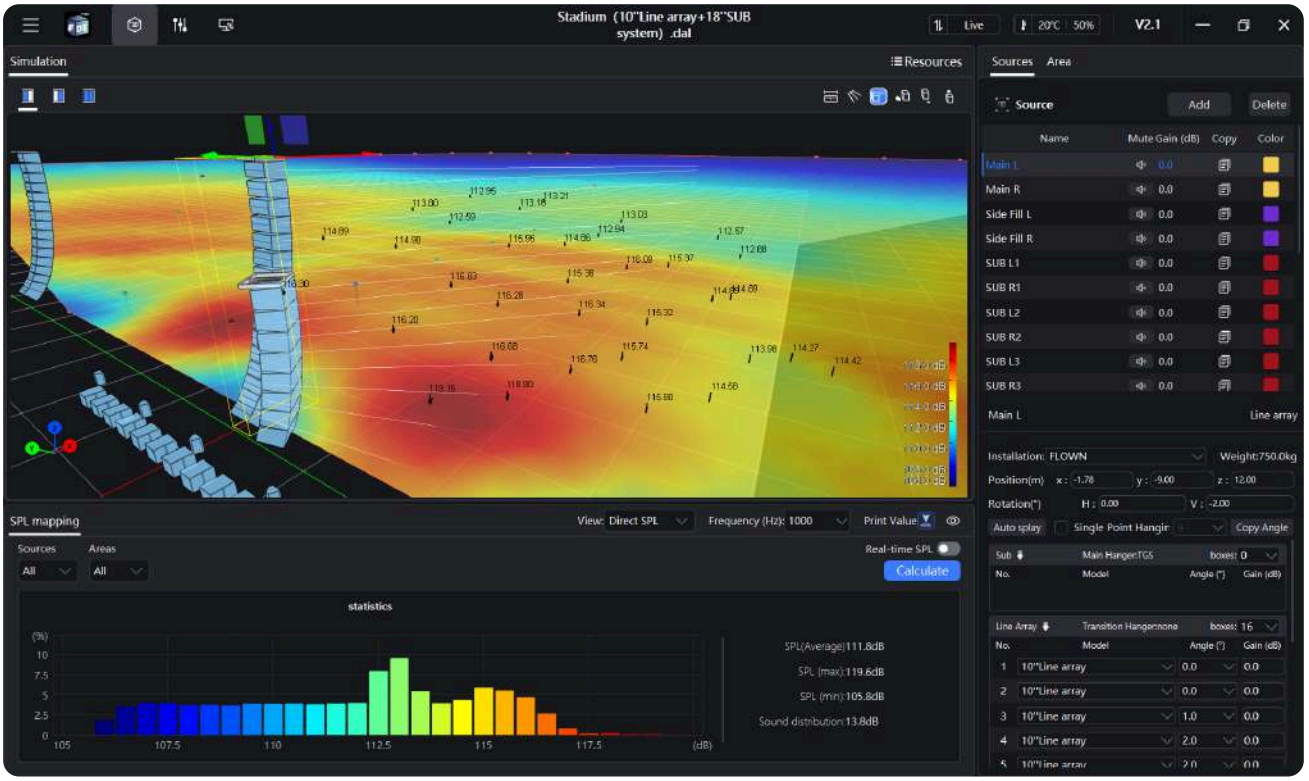


Figure 3-31 Simulation result dot marking

3.6.2 Simulation result range setting

Click the range bar to access the simulation result range settings. The software defaults to automatic range. Click the "Auto" button to toggle the display range between automatic and manual.

Auto Range: The software automatically determines the range based on the minimum and maximum values of the current sound pressure level distribution. The minimum value is displayed in dark blue, and the maximum value is displayed in dark red.

Manual Range: The software displays the sound pressure level distribution results based on the manually set range. Results below the minimum range are uniformly displayed in dark blue, and results above the maximum range are displayed in dark red.

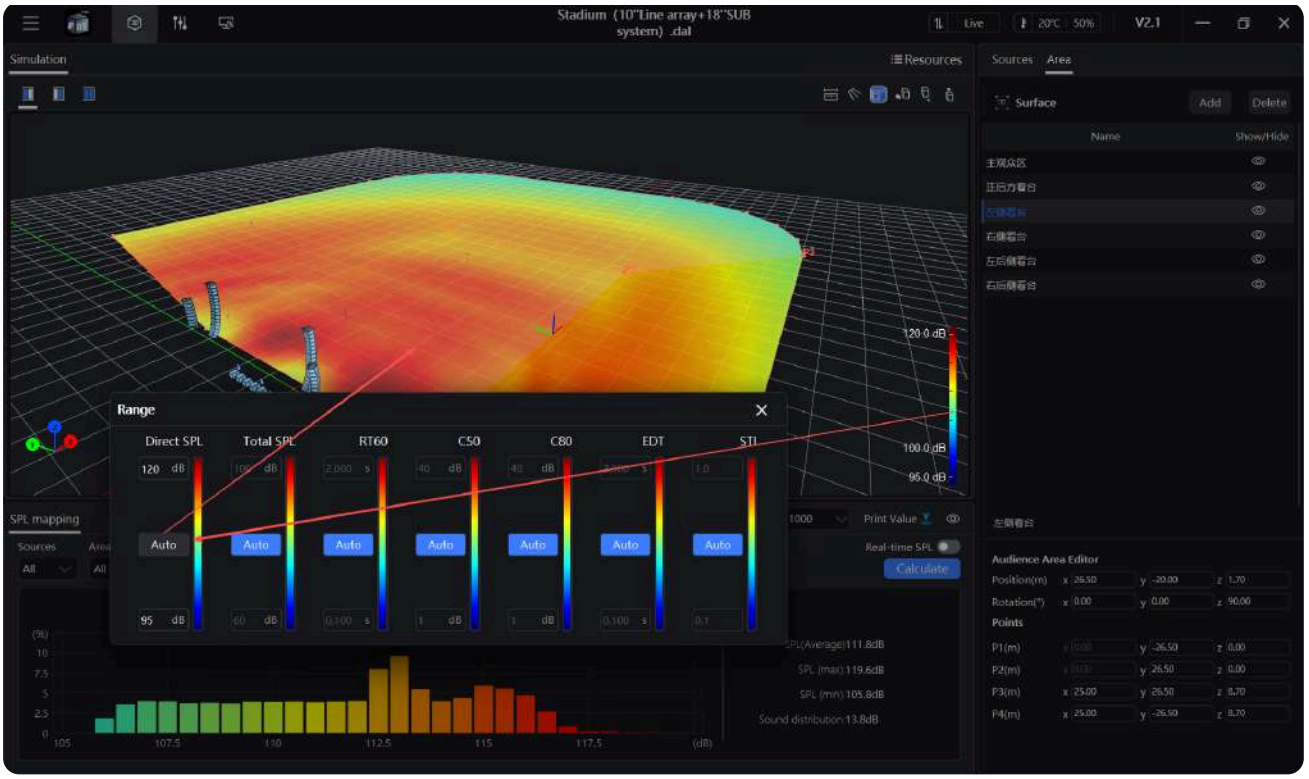


Figure 3-32 Simulation result range setting

3.7 Export simulation report

Click Project Management in the upper left corner of the software and click Export Report to enter the simulation report export configuration interface. Enter basic project information and spatial information, select the indicators to be exported, and click to preview the report content on the right. Confirm and export to obtain a complete acoustic simulation report.

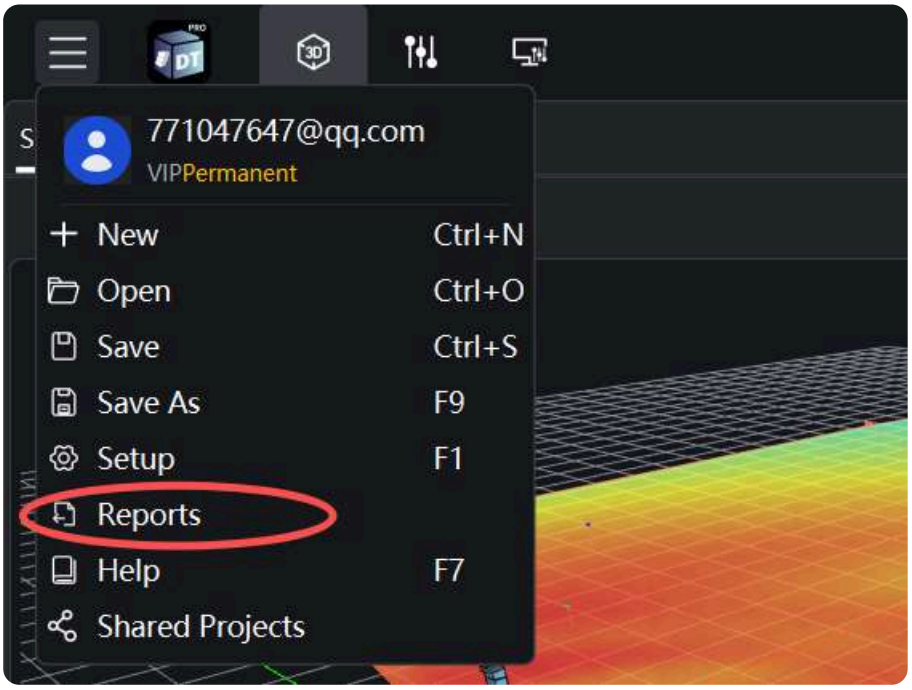


Figure 3-33 Export report entry

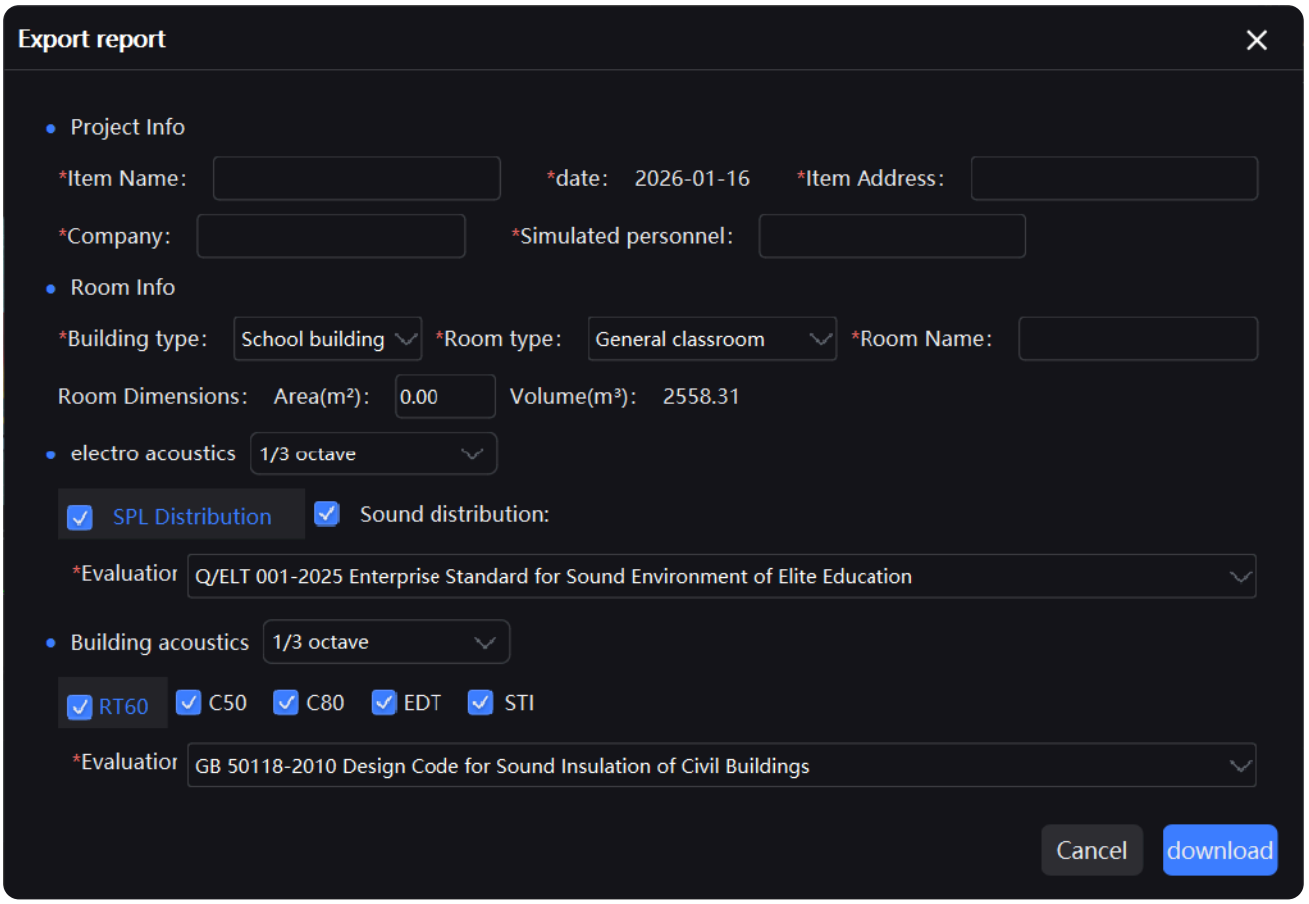


Figure 3-34 Simulation report export configuration

4.Designing an Architectural Acoustics Simulation Project in DT-PRO Software

4.1 Select a Mode

On the startup page, select the Room Simulation mode to enter the main Architectural Acoustics Design program.

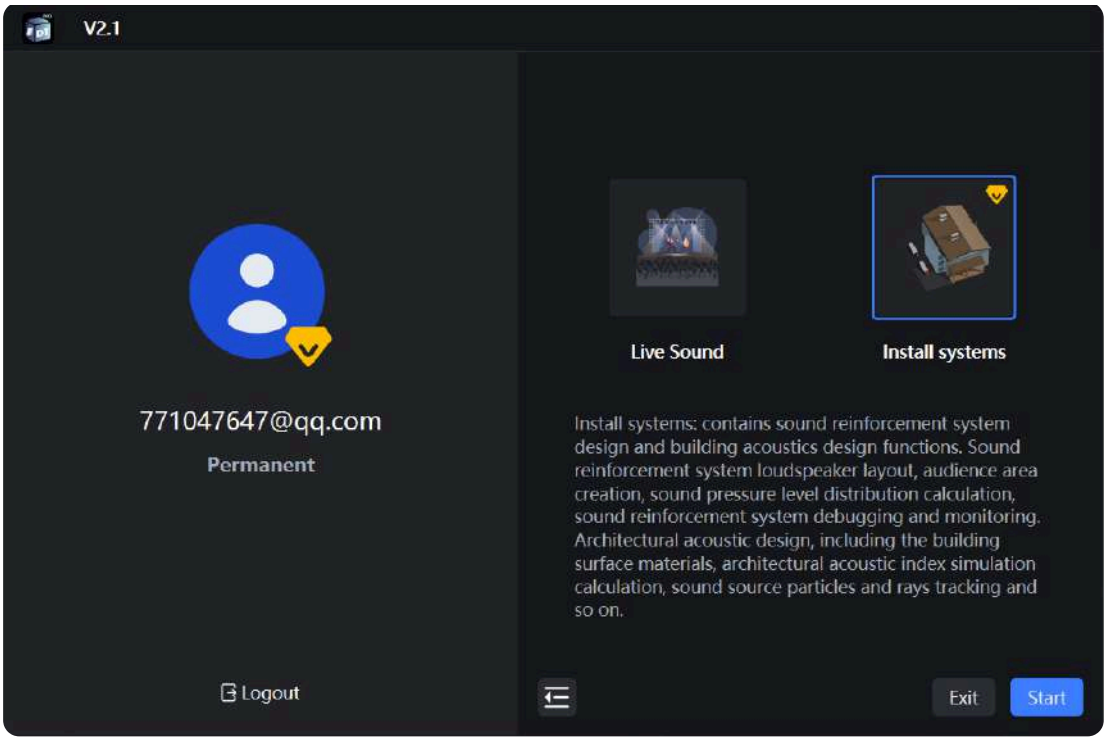


Figure 4-1 Selecting indoor simulation mode

4.2. Importing building models

We begin the simulation design of a new project by importing the project's 3D model into the software. Once successfully imported, the model will appear in the 3D viewport. Verify that the model's surface is intact and that the grouping information is consistent with the model before proceeding to the next step.

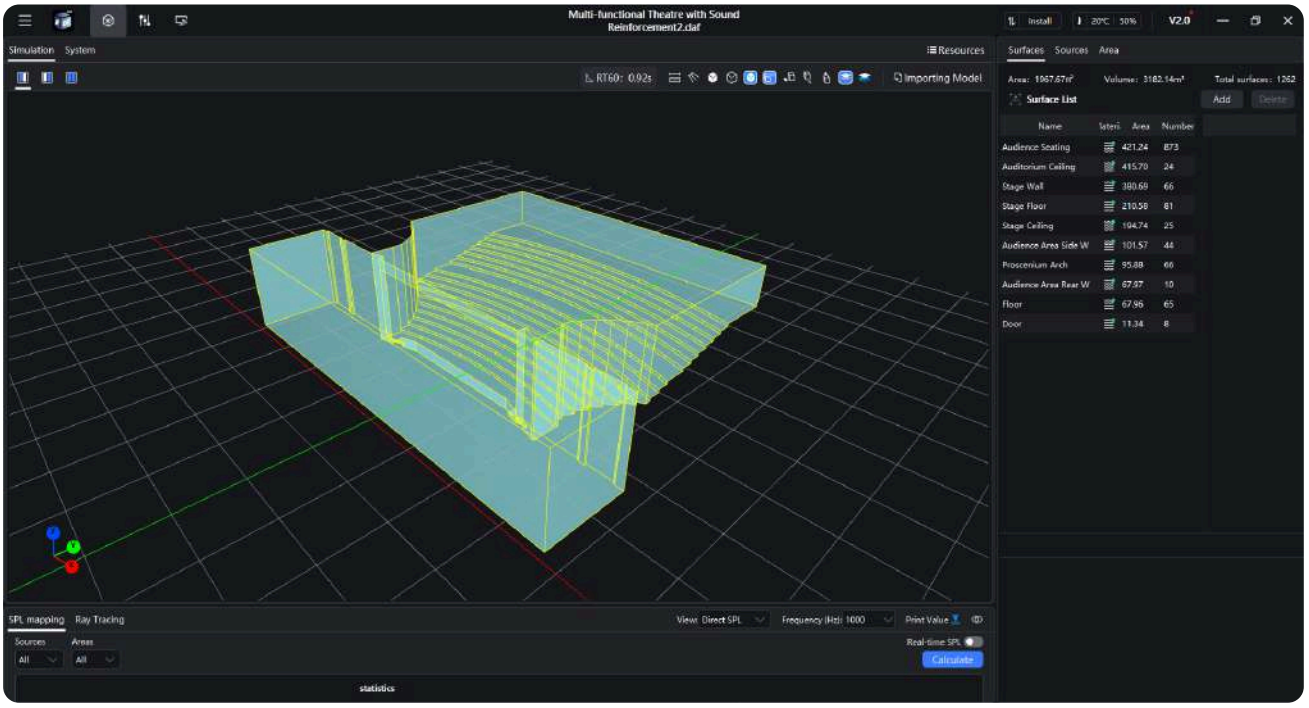


Figure 4-2 Imported building model displayed in 3D view

4.3. Model material matching

Match the corresponding materials for each surface group and sound-absorbing material of the project, and select sound-absorbing materials and common surface materials.

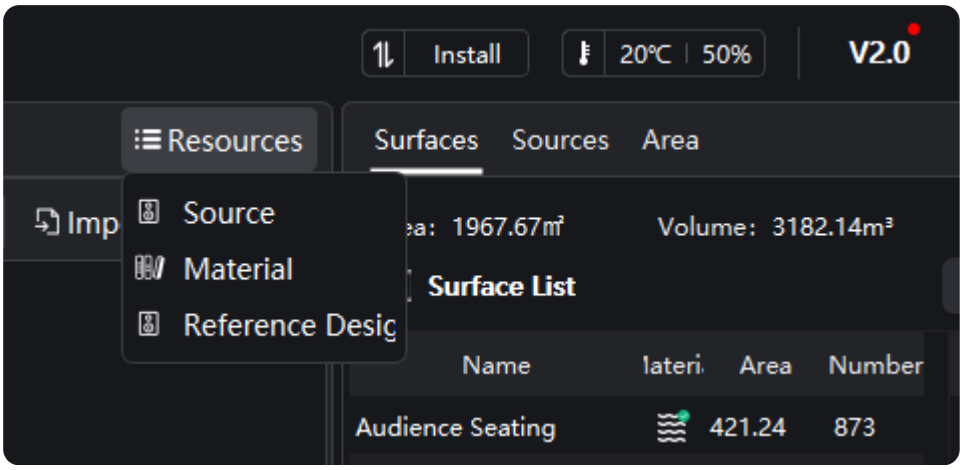


Figure 4-3 Select the material icon under each surface group

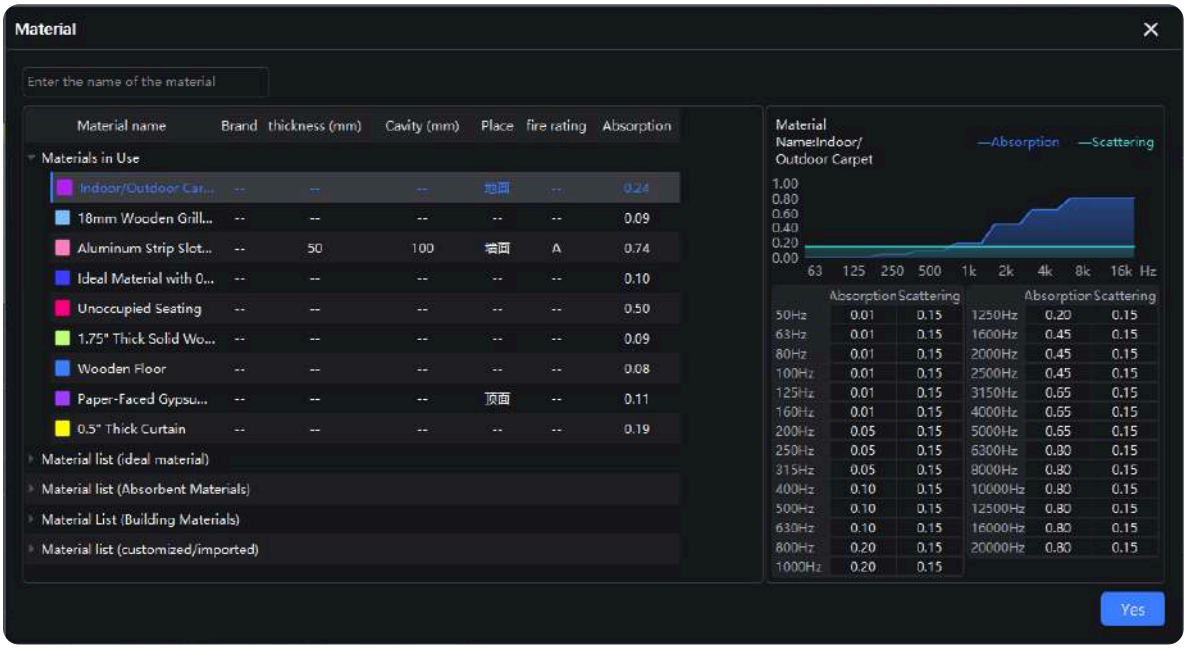


Figure 4-4 Enter the material library and select materials

4.4. View the formula to calculate the estimated reverberation

After assigning materials to all groups, you can view the reverberation time results calculated using the Yilin formula above the model view. This function averages the total absorption area of each surface group in the room. You can use this value to preliminarily predict the sound absorption performance of the current material combination and make optimization adjustments.

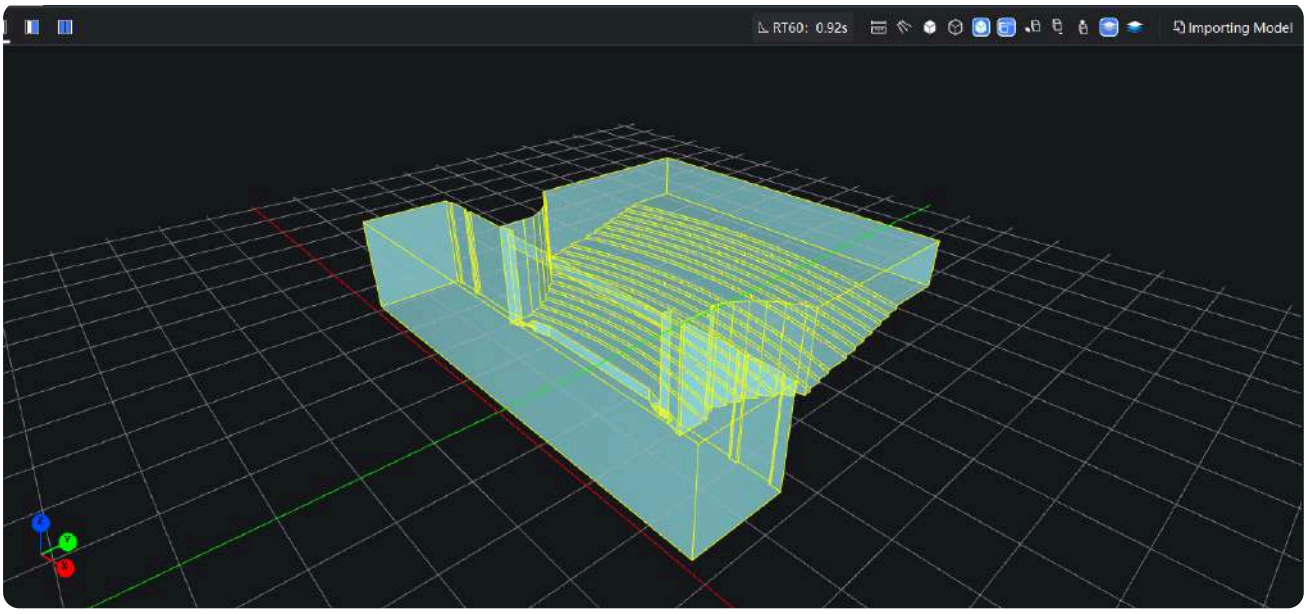
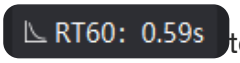


Figure 4-5 Click the reverberation time icon

Click the button 

to expand the line graph of each frequency band of the complete reverberation time, and you can view the specific calculation results of the reverberation time in each frequency band.

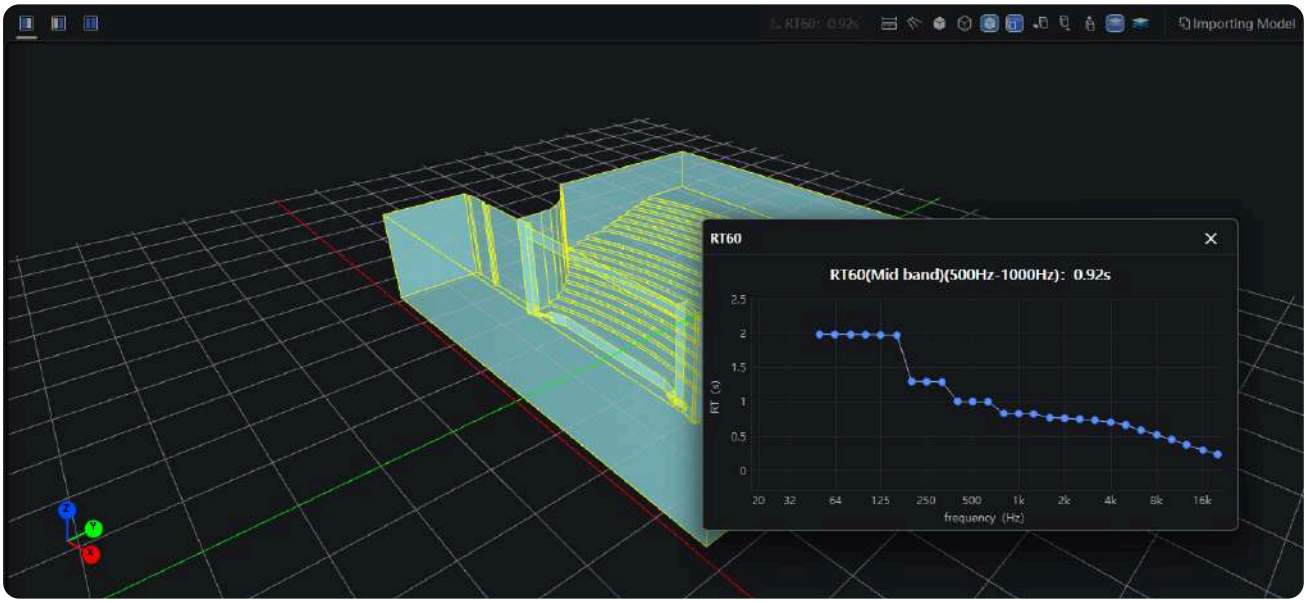


Figure 4-6 shows the estimated reverberation time for the entire frequency band

4.5. Place the sound source

For architectural acoustics simulation, select an omnidirectional sound source to simulate a real-world measurement environment. You can adjust the coordinates to simulate different placements of the omnidirectional sound source in the room.

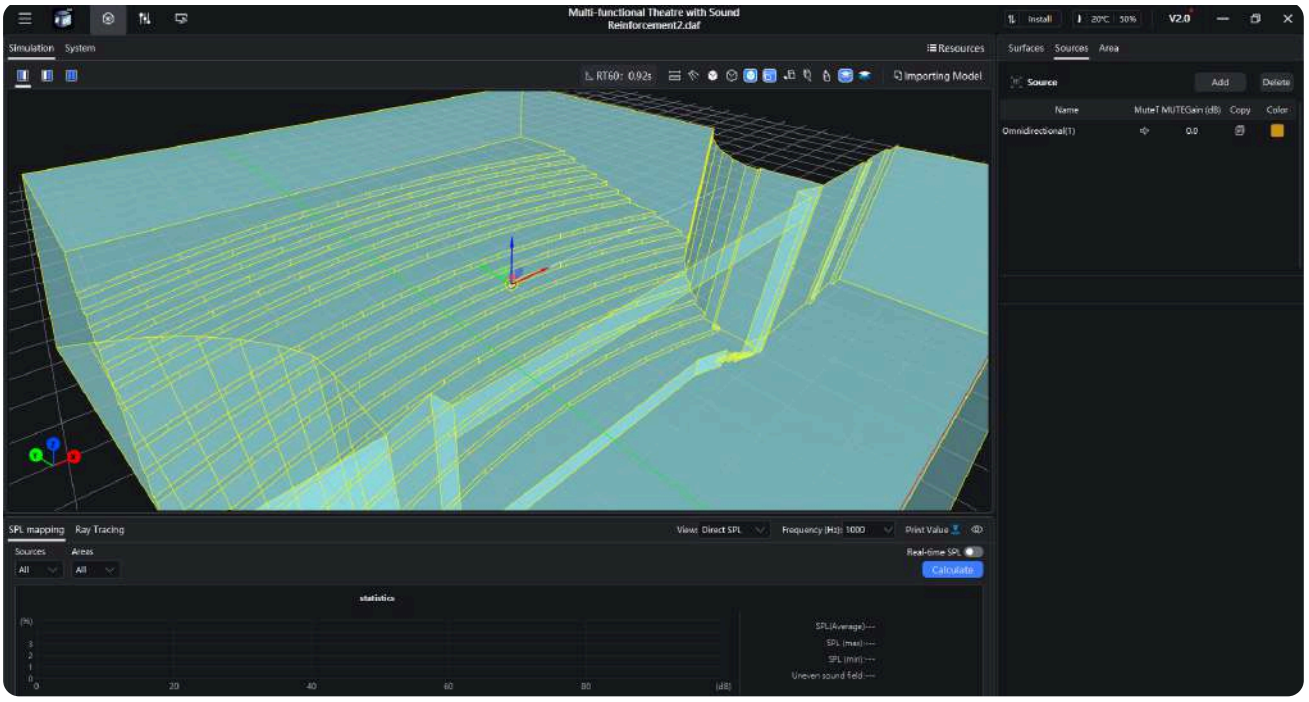


Figure 4-7 Omnidirectional sound source placement

4.6. Add audience listening area

The audience listening area is drawn according to the distribution and shape of the indoor seating area. It is used to present the indicator data of the simulation. The default height of the audience listening area is 1.2m above the ground.

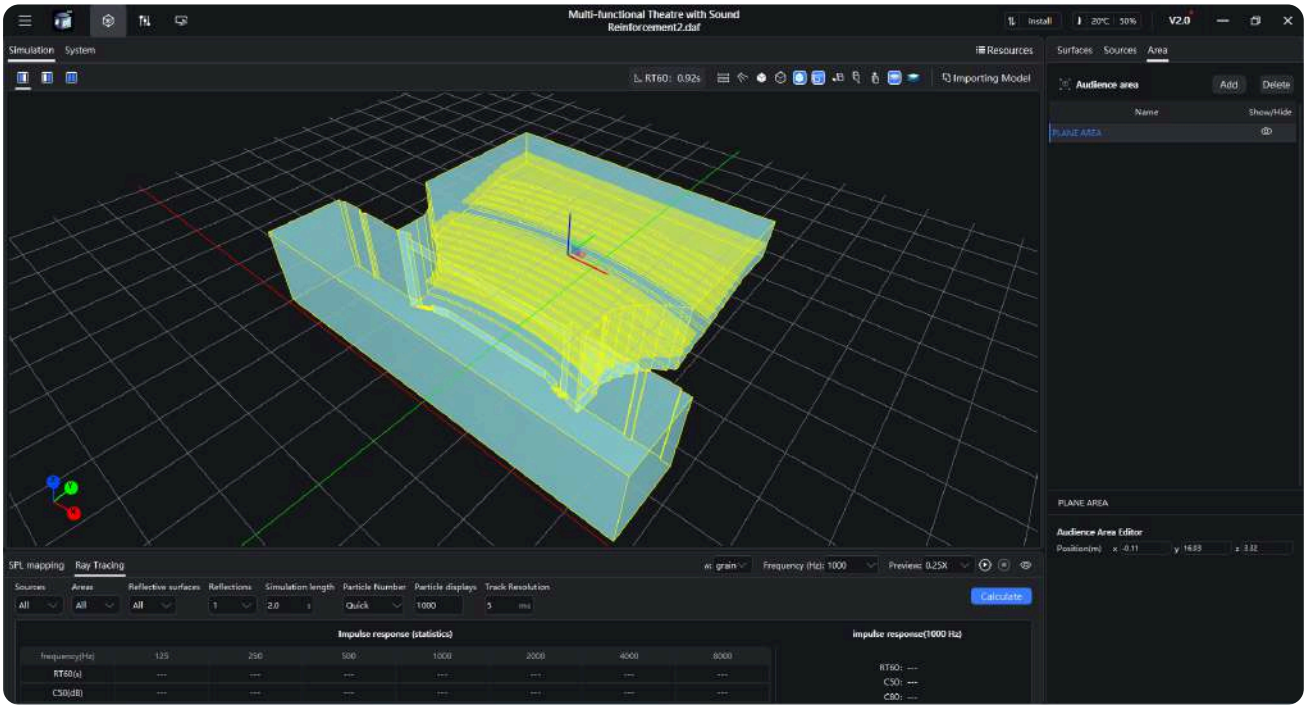


Figure 4-8 Adding an audience listening area to the project

4.7. Simulation calculation

4.7.1 Ray tracing parameter settings

After completing the previous steps, we can proceed to the final step - simulation calculation. We usually need to set the parameters first. After confirming the following parameters, click Calculate.

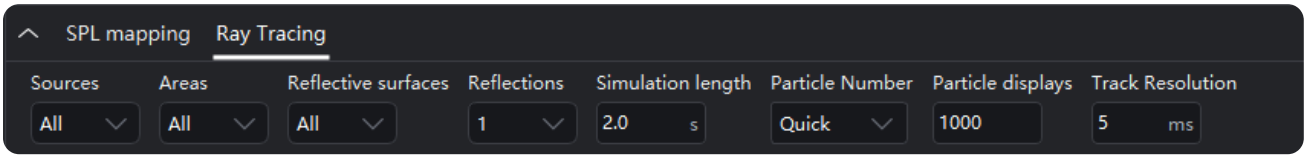
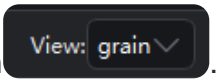


Figure 4-9 Ray tracing calculation configuration

Parameter setting items	Corresponding functions
Sound source selection	For architectural acoustics simulations, we don't need to select all sound s omnidirectional sound source.
Audience area	The audience listening area settings can be customized based on the simu venues, we can select the corresponding settings to analyze the results of standard classroom scenarios, we can simply select a centralized audience
Reflecting surface	For standard scenarios, the default setting of "All" is sufficient. For perform analyzing the acoustic reflection function of specific surface groups to verif rays reach the audience, we can select the corresponding group, calculate trajectory.
Number of reflections	The number of reflections is the upper limit of sound ray reflection behavior source ray will terminate when the number of reflections is reached. The nu depth. A higher number of reflections captures more complete late reflectio density of sound rays.
Simulation length	A longer simulation length captures the decay of sound source particles lon emitted, resulting in more accurate simulation results. It's recommended th less than the reverberation time of the current space. The reverberation tim can be used as a reference for the simulation length.
Number of sound source particles	The number of sound source particles indicates the number of particles use the simulation. A higher number of particles results in more accurate calcul calculation time. You can select different settings based on your desired ac over the box displays the corresponding number of particles used, or you c particles.

Number of displayed particles	The displayed number of particles is primarily used for particle animation e only a subset of particles for animation effects to avoid poor display quality limitations or dense particle density.
Time step	The time step sets the time resolution of the particle trajectory. The simulat coordinates at a series of time points, evenly spaced at a certain interval. T smaller value results in higher accuracy but also increases the time require

4.7.2 Ray Tracing View Switching

After obtaining the calculation results, we can switch the view in the view switching area. The view can be divided into dynamic view and static indicator distribution, which can be switched by pulling down 

.

Indicator	Meaning
Particles	Displays the propagation path of sound after a sound source is emitted as particl
Rays	Displays the propagation path of sound after a sound source is emitted as rays.
RT60	Displays the reverberation time distribution of the space at the selected audience
EDT	Displays the early decay time distribution of the space at the selected audience li time determined by the slope of the decay curve from 0 to -10 dB in the early par after the sound source stops emitting sound.
C50	Displays the C50 distribution of the space at the selected audience listening area to reverberant sound energy, measured in dB. Early sound at C50 refers to the di sound within 50 ms. Reverberant sound at C50 is the sum of multiple reflected so speech reinforcement systems.
C80	Displays the C80 distribution of the space at the selected audience listening area to reverberant sound energy, measured in dB. C80 early sound refers to the direc sound within 80 milliseconds. C80 reverberant sound is the sum of multiple reflec to evaluate music sound reinforcement systems.
STI	STI distribution maps for the selected audience listening area are displayed for th

The dynamic view includes rays and particles. You can click 

to adjust the animation speed, play/pause the animation, play it from the beginning, and perform design analysis through the motion trajectory of the sound.

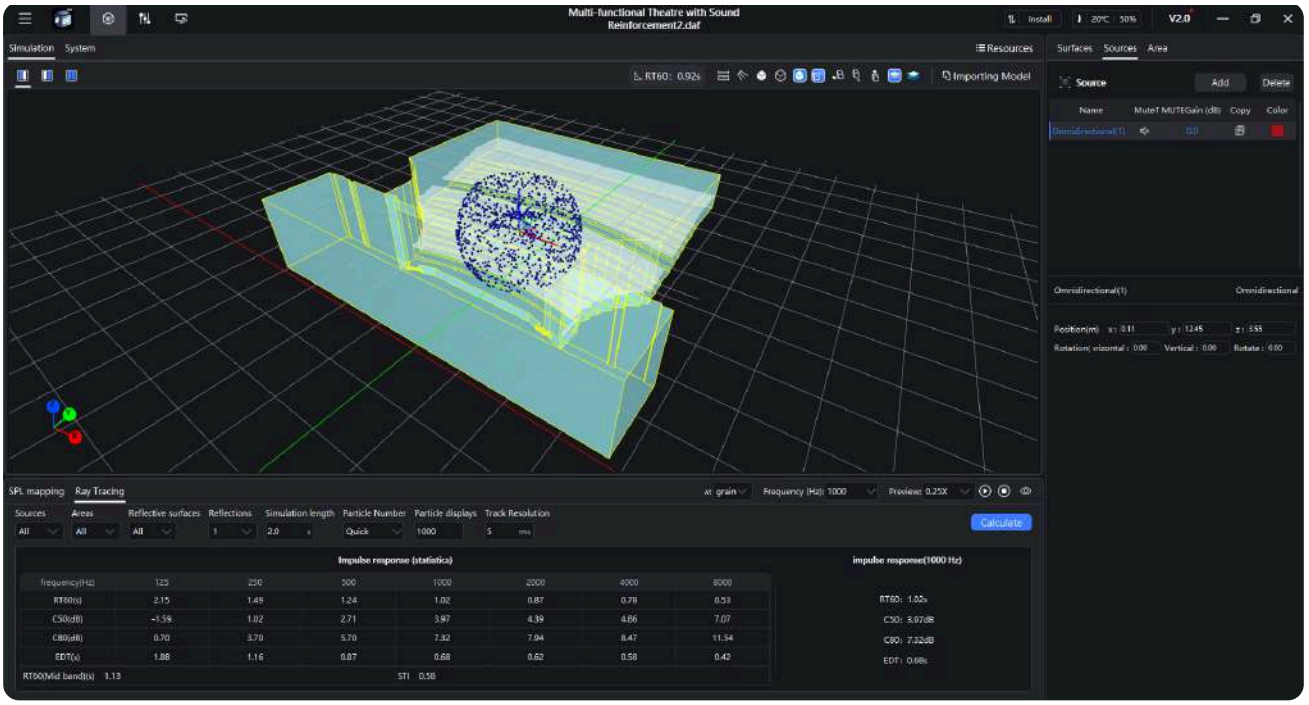


Figure 4-10 Ray tracing sound particle animation playback

Static views include RT60, EDT, C50, C80, and STI, allowing you to switch between different frequency bands for viewing. You can also click to view simulation data for a specific location, or edit the range to adjust the color distribution of the audience listening area results.

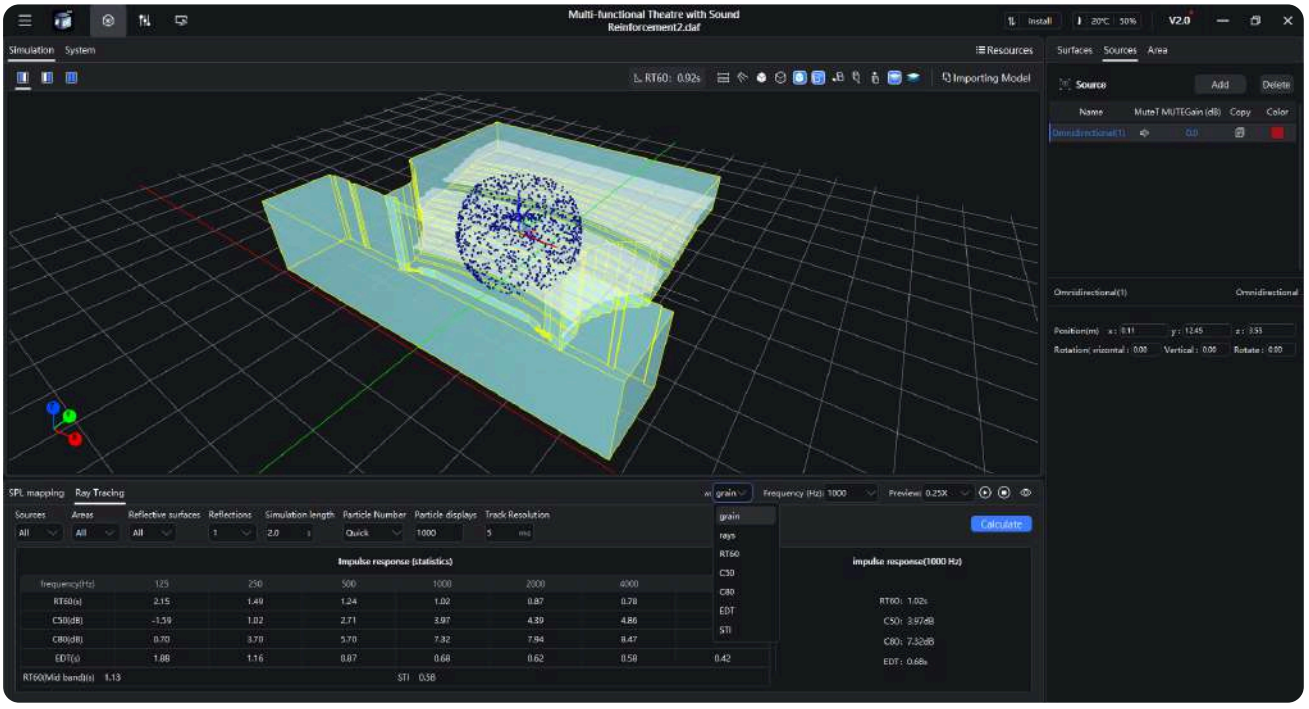


Figure 4-11 Ray tracing RT60 reverberation time distribution

4.7.3 Impulse Response Statistics

In addition to viewing the simulation results in the model audience listening area, you can also view the impulse response statistics directly below. These statistics include the results of various

metrics (excluding STI) at different frequency bands, as well as the mid-frequency reverberation value and STI. This provides a visual overview of the calculated results for all metrics. You can compare the simulation results with your design goals and make adjustments to optimize the sound-absorbing materials. Once the results meet your requirements, you can export them as a report to create a complete simulation solution report.

Figure 4-12 Pulse response statistics

5.Design a sound reinforcement system simulation project in DT-PRO Software

5.1 Select Work Mode

In the startup program, select the operating mode.

Live Sound mode requires no account login and provides outdoor sound reinforcement system simulation, calculating only the direct sound of the reinforcement system.

Install systems mode requires VIP account verification and provides indoor sound reinforcement system simulation, architectural acoustics design simulation, and can output metrics including direct sound of the reinforcement system, total sound pressure level, architectural acoustics reverberation time, EDT, C50, C80, STI, and other indicators.

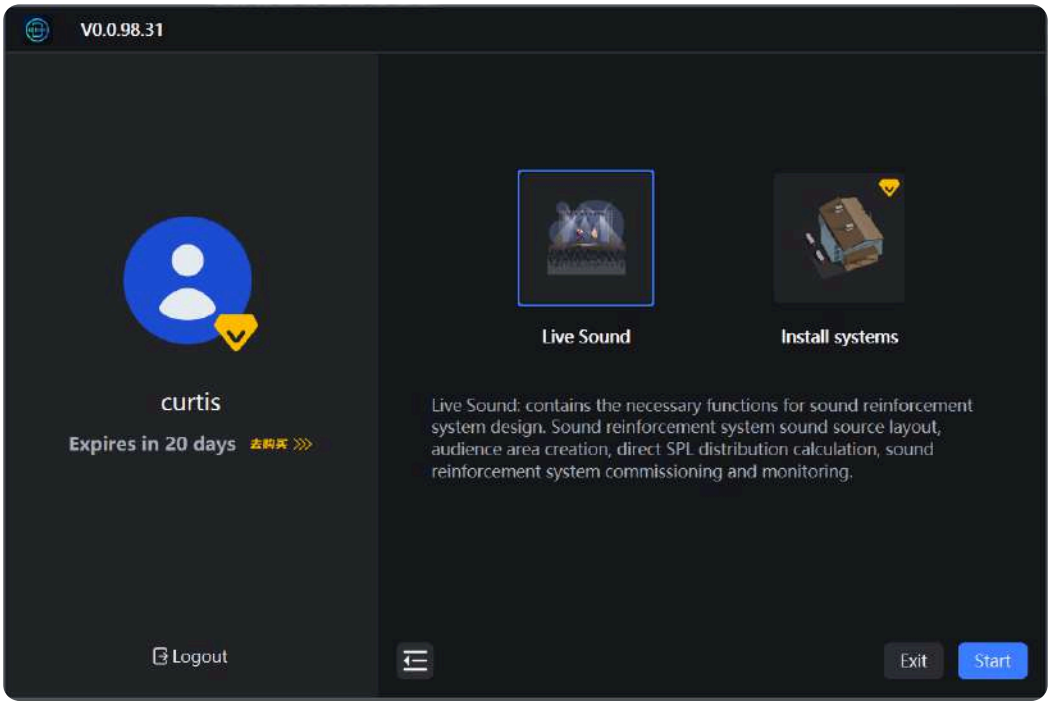


Figure 5-1 Selecting the work mode in the startup program

5.2 Import Source Files

If your project requires importing external speaker data files, you can import sound sources through the sound source library.

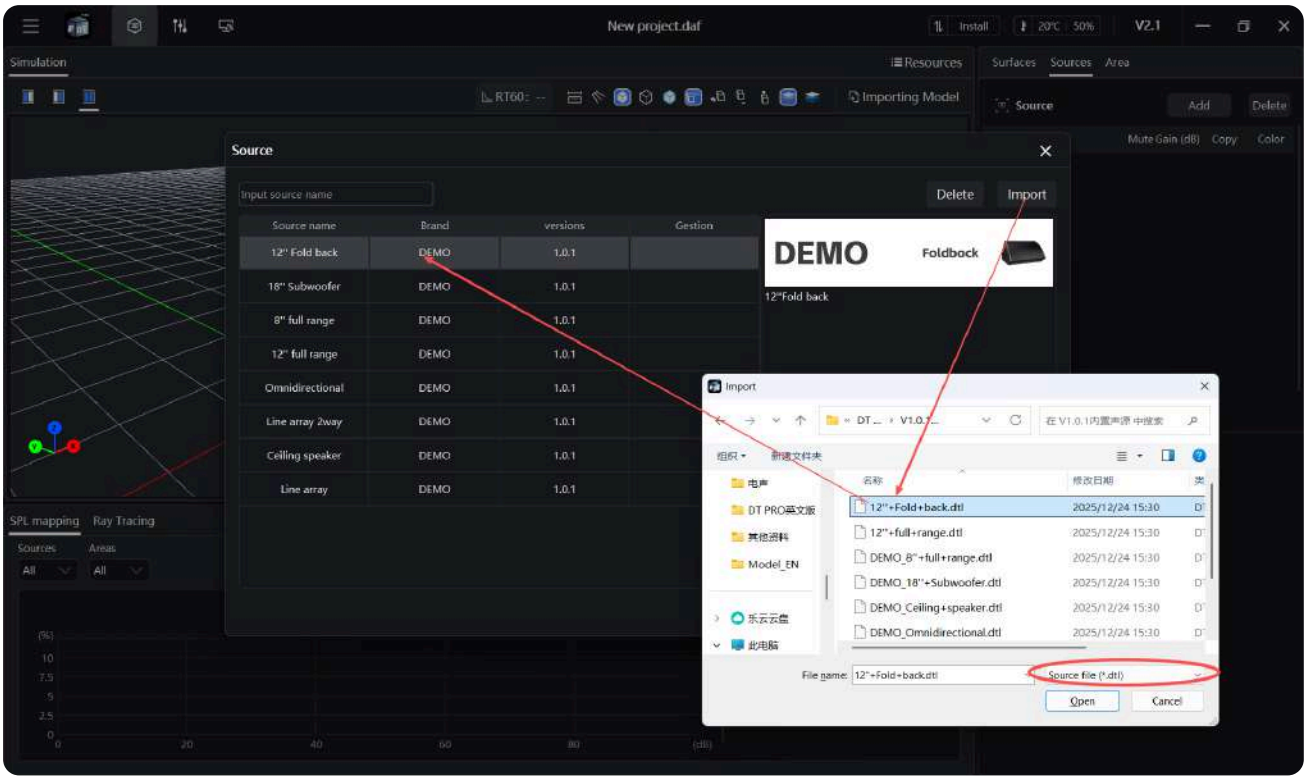


Figure 5-2 Importing Source Files into the Source Library

5.3 Import Building Model (Indoor Acoustic Simulation)

In Install Systems mode, you can begin our new project by importing a building 3D model using the software. First, import the prepared 3D model by clicking the toolbar on the main interface. Additionally, you can refer to the instruction manual to help you import the correct model. For detailed model processing, please consult:

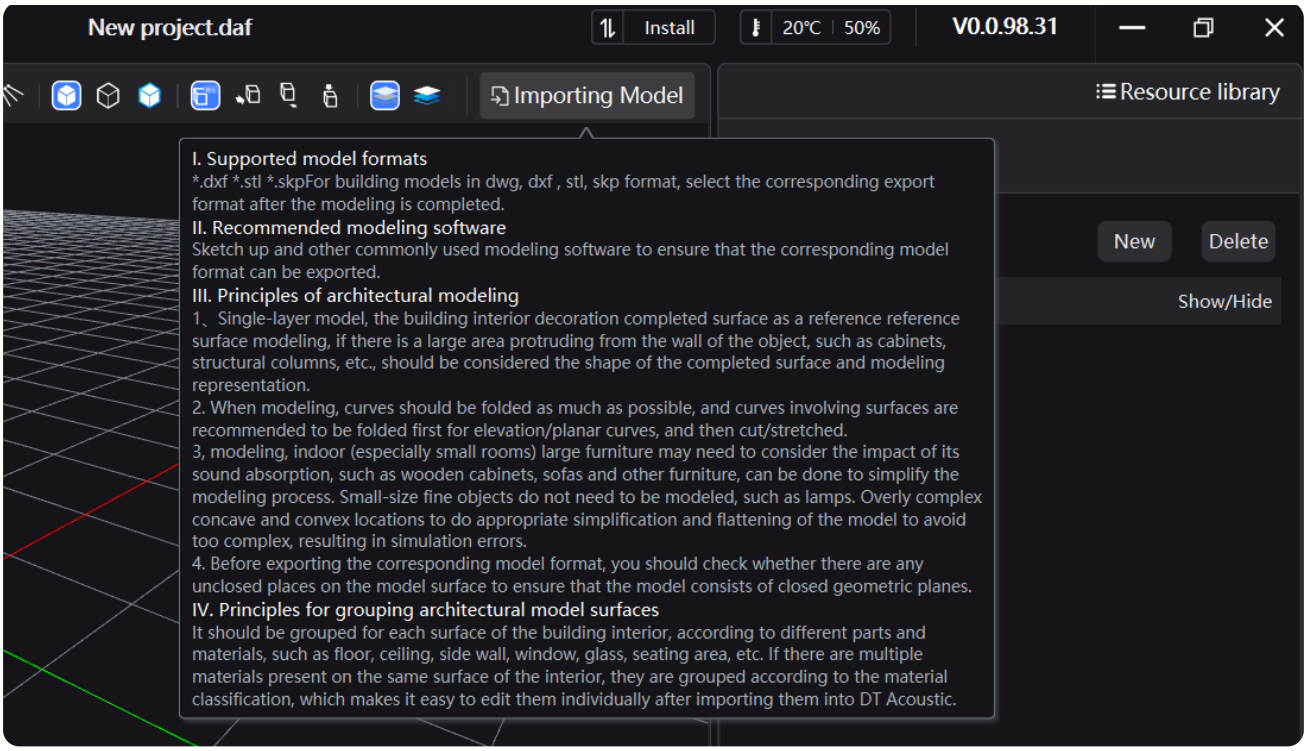


Figure 5-3 Importing Building Models for Projects in Install systems Mode

5.4 Create an audience area

When simulating a sound reinforcement system, it is necessary to add appropriate audience zones to render sound pressure level distribution results. Both the Install Systems mode and Live Sound mode provide a wide range of audience zone templates. You can access them by navigating to View specific rules for creating and editing audience segments.

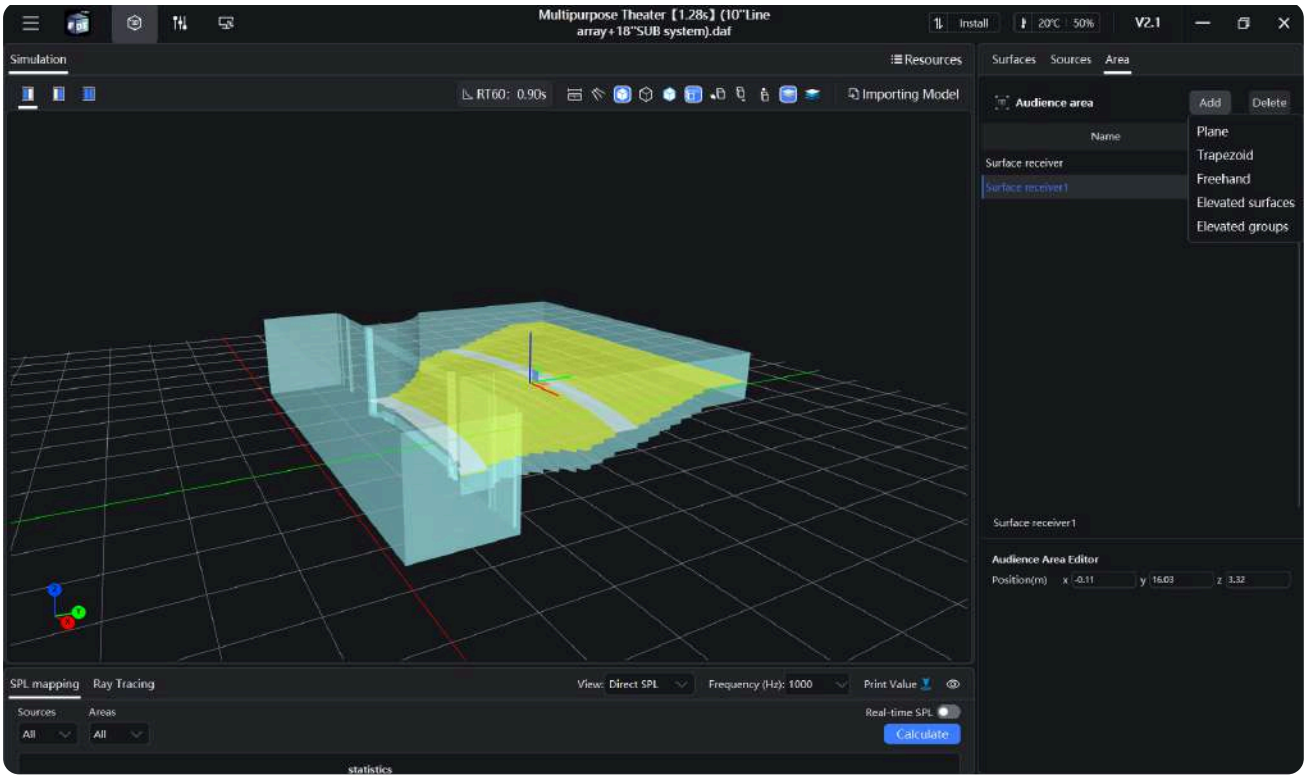


Figure 5-4 Install systems Mode Audience Area

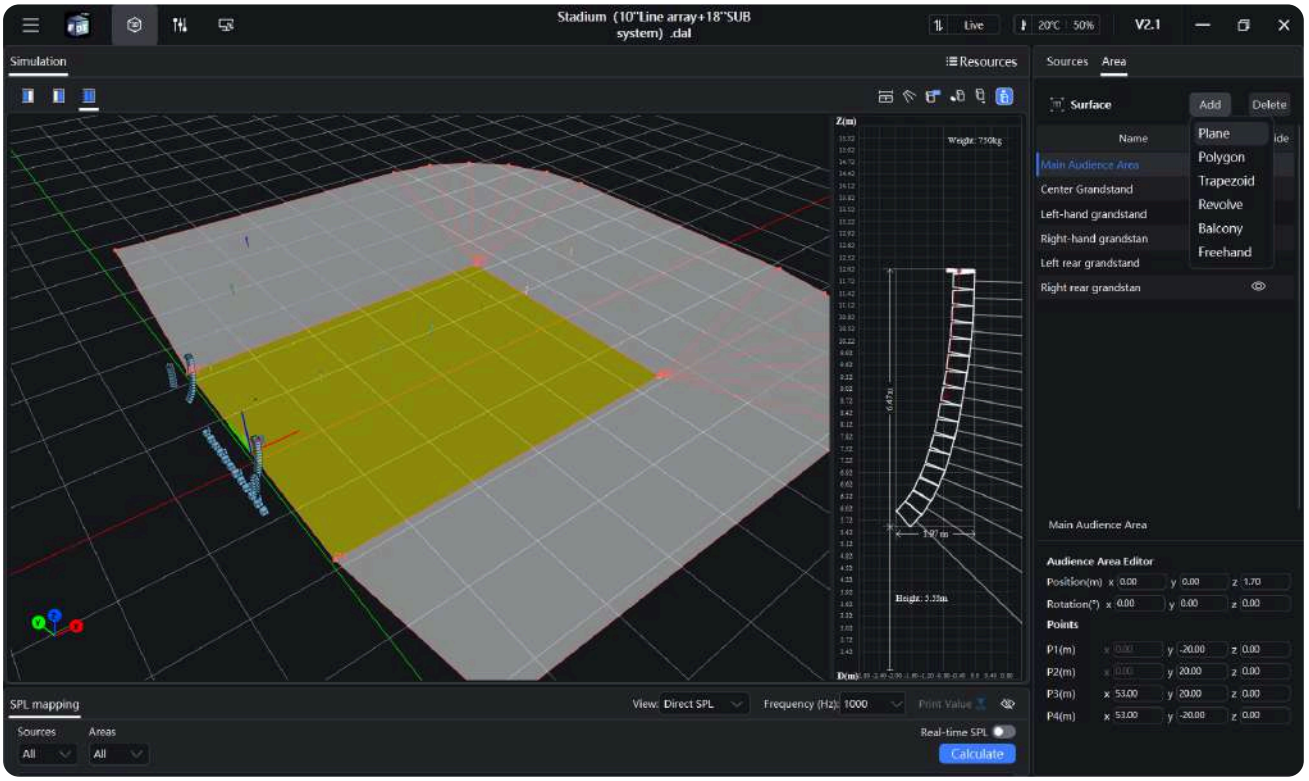


Figure 5-4 Live Sound Mode Audience Area

5.5 Add sound source

By adding sources on the Source List page and utilizing the sound source duplication feature, you can quickly add sources to your project and perform necessary edits. For specific instructions on adding and editing sources, please refer to:

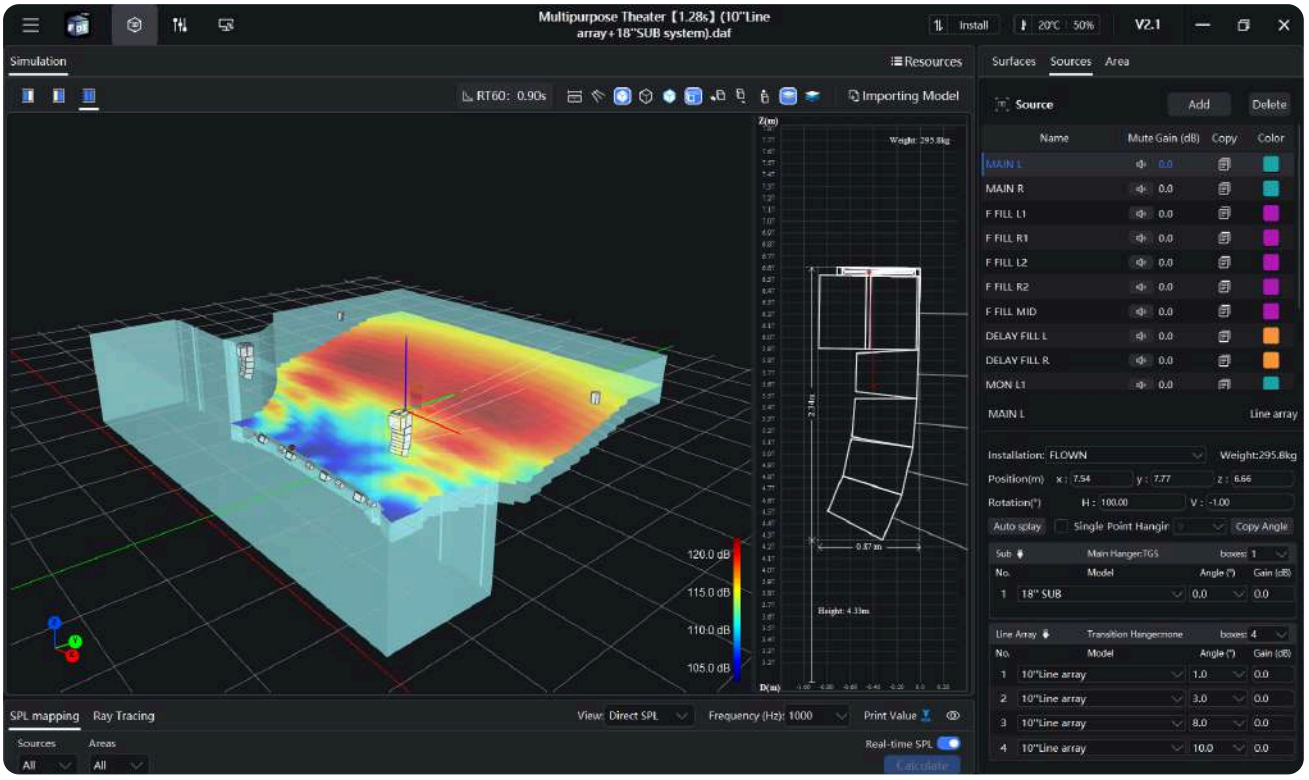


Figure 5-6 Adding Speakers (Install Systems Mode)

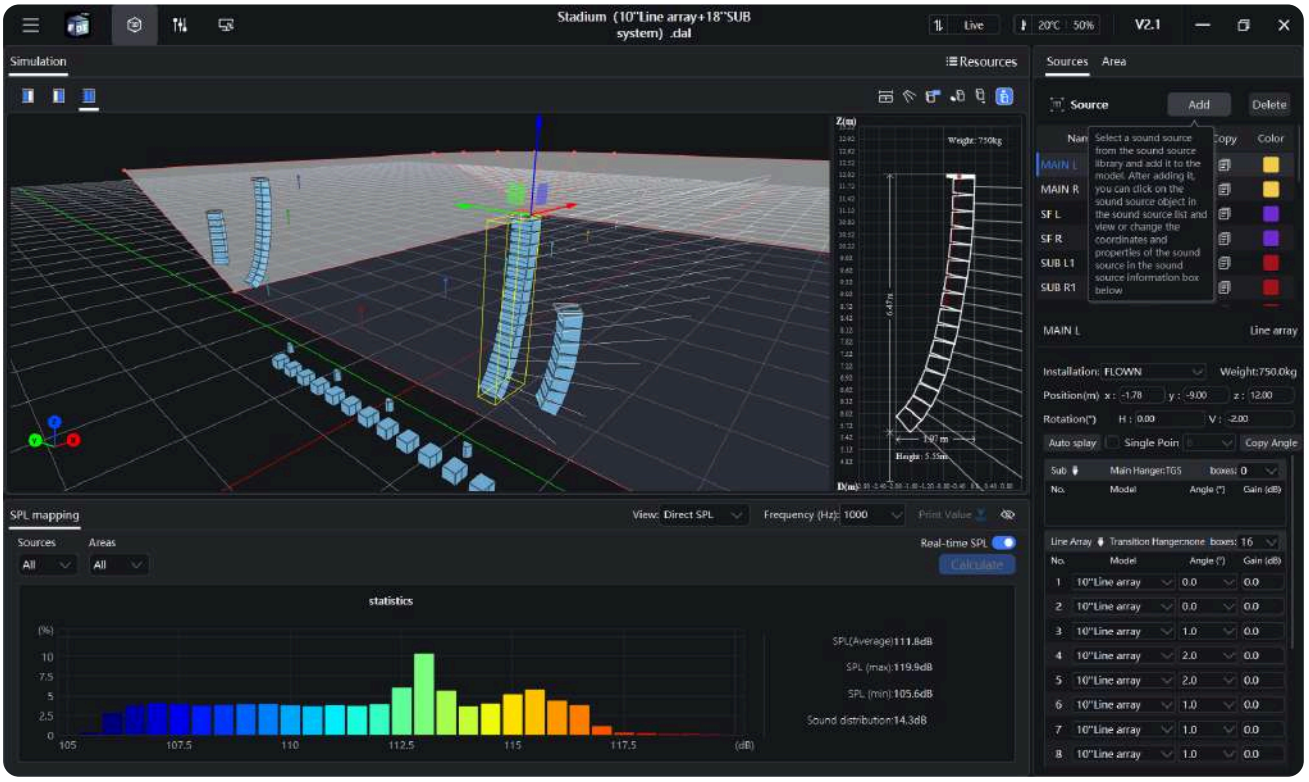


Figure 5-7 Adding Speakers (Live Sound Mode)

5.6 Acoustic Simulation

5.6.1 Real-time Direct SPL Simulation Calculation

In the simulation calculation window below the software, enable the real-time direct sound switch Real-time SPL to render the current speaker's sound pressure level and distribution statistics at the listening plane in real time. You can configure the sound sources and listening planes included in the calculation. Adjusting the properties of sound sources or listening planes will update the simulation results instantly. Use the frequency selection option to view sound pressure level distributions at different frequencies.

Note: Real-time SPL simulation only supports calculating direct sound SPL. Results cannot be saved to the project file or exported in the simulation report.

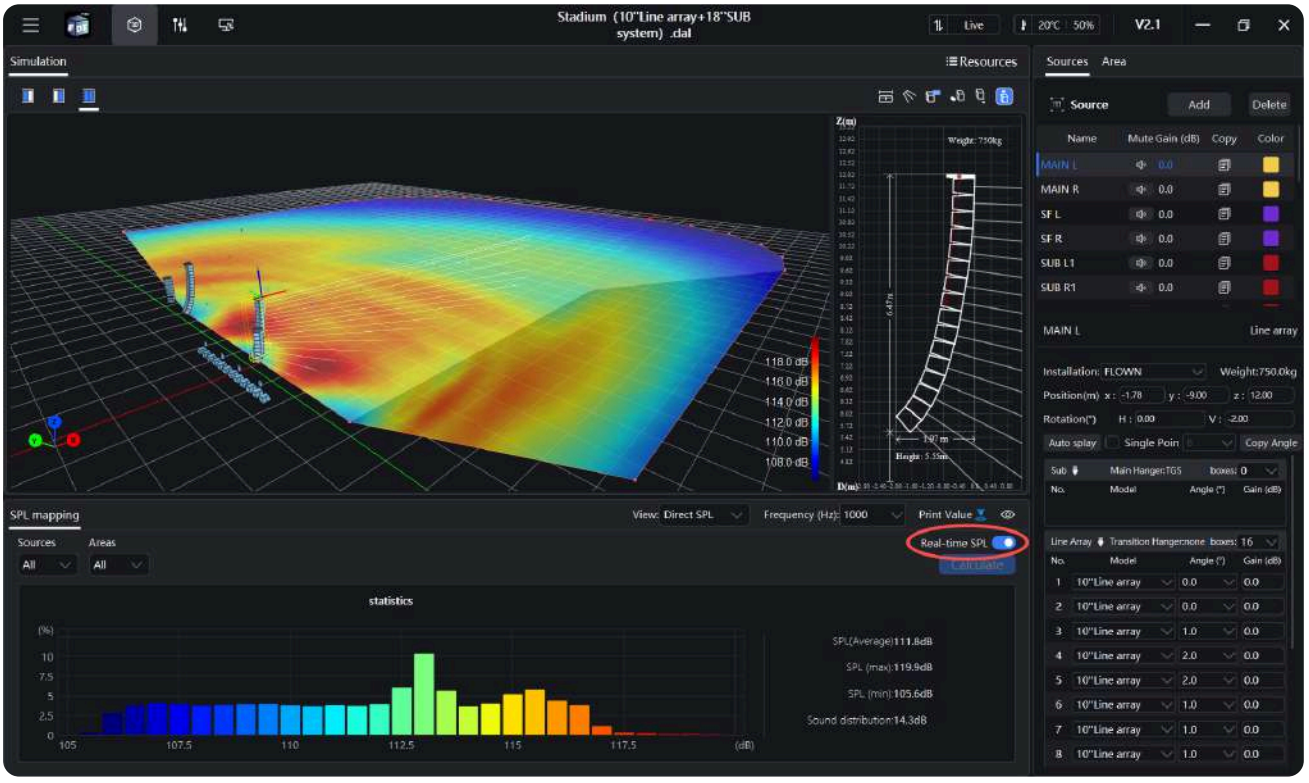


Figure 5-8 Real-Time Direct SPL Simulation Calculation

In the software's simulation calculation window, after disabling the real-time direct sound switch Real-time SPL, you can manually calculate the sound pressure level distribution. Manually calculated sound pressure level distribution results will be cleared when changes occur to the properties of the sound source or audience area.

Note: Manually calculated sound pressure level distribution results include direct sound pressure level and total sound pressure level (Install systems mode). Simulation results can be saved within the project and exported as simulation reports.

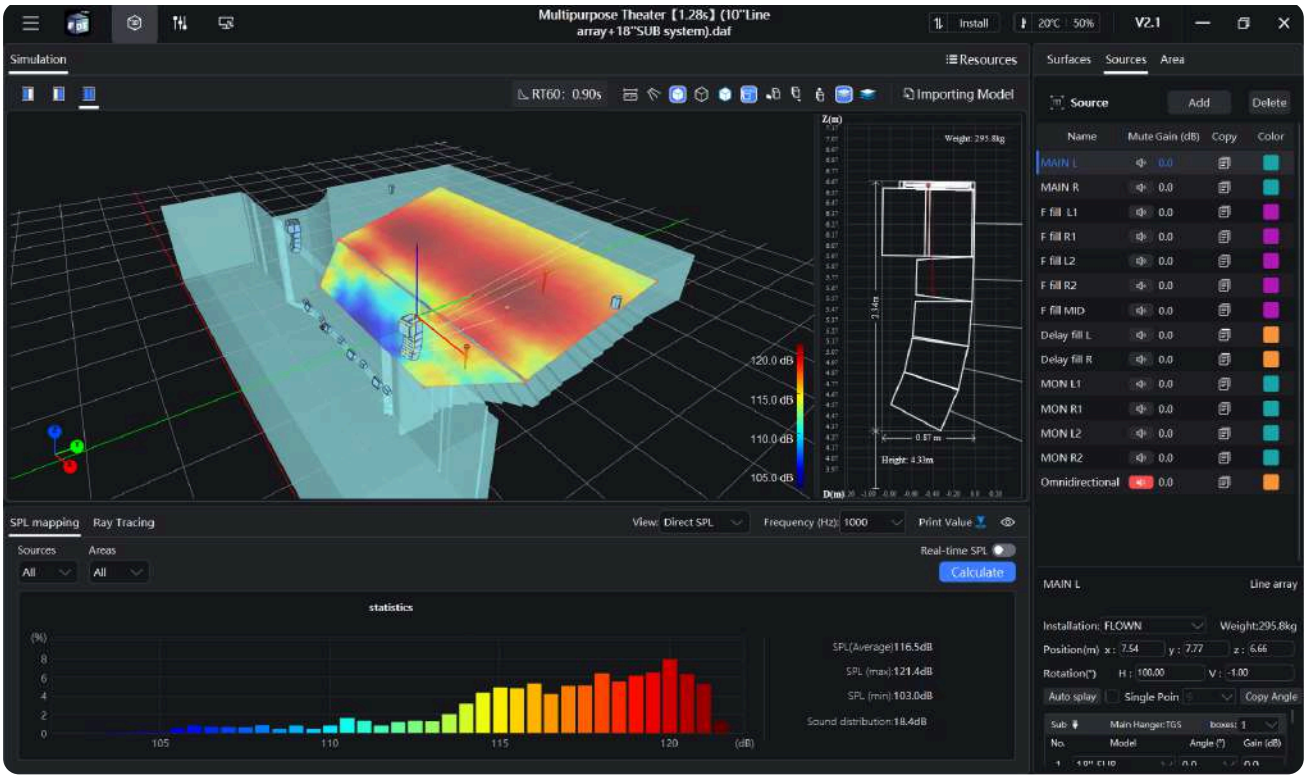


Figure 5-9 Figure 5-9 Manual Simulation Calculation of SPL

6.Processing sources using virtual DSP devices in DT-PRO

In DT-PRO Software, virtual DSP devices from this software platform can be added to projects. By connecting the channels of the virtual DSP device to the sound source, additional DSP processing can be applied to the sound source. The processed results are fed back to the simulation in real time, enabling virtual debugging.

6.1 Add the Virtual DSP Device to the Project

Access the DT-PRO Virtual Debugging Navigation page. On the Virtual Devices tab on the right, add devices to incorporate virtual devices into your project. After adding them, you can name each virtual device as needed to distinguish it based on the speakers it requires to connect and process.

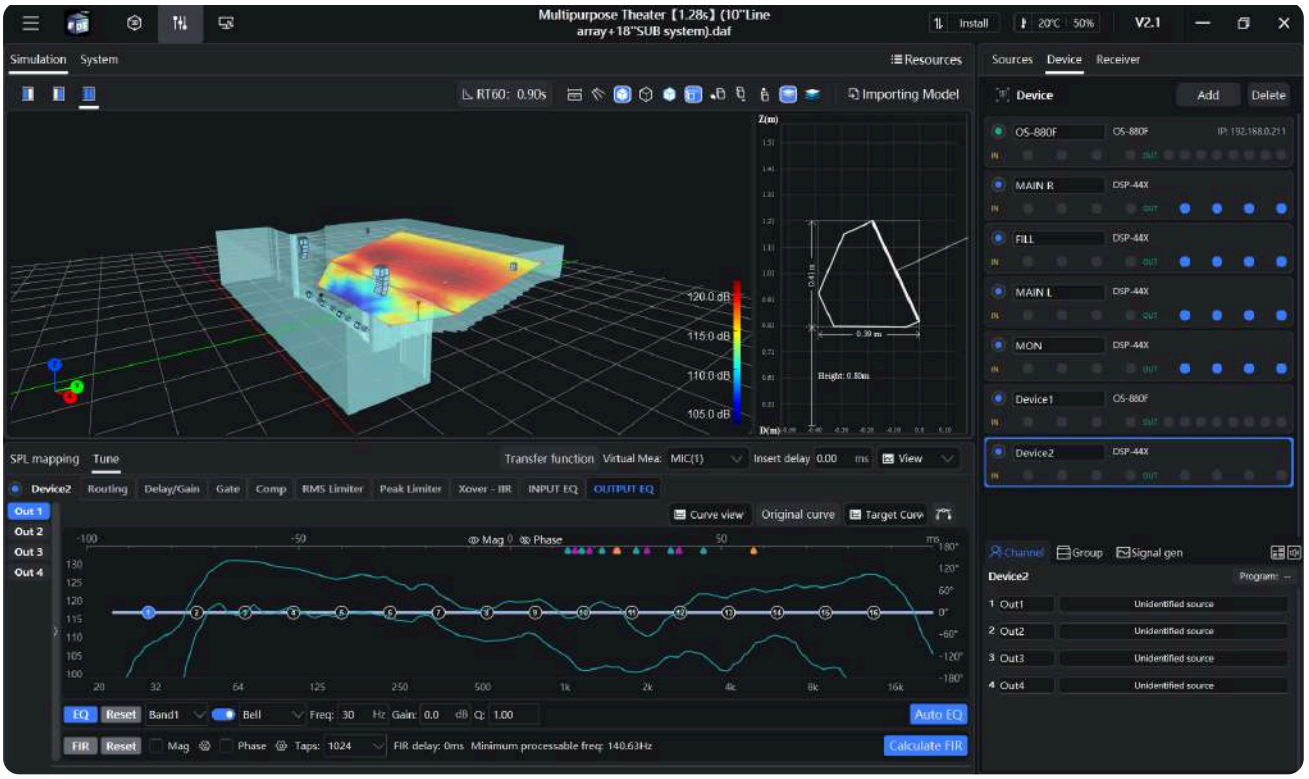


Figure 6-1 Adding Virtual Devices to the Virtual Debugging Module

6.2 Connect the audio source to the virtual DSP

To link a virtual DSP channel to a sound source for processing, simply select the virtual DSP device. The device's output channels will appear in the Device Channels tab below. Within the Link Sound Source option, check the sound source in the current project to link it to the corresponding DSP channel. Simultaneously, the channel will turn blue, indicating it is occupied. The linked speaker will also appear in light blue.

Note 1: Each speaker will require connection to a number of channels based on its audio path definition;

Note 2: Each DSP channel can link multiple speakers to achieve speaker parallel connection. A single DSP channel only supports simultaneous connection of multiple speakers of the same model;

Note 3: When a line array sound source comprises multiple connected speakers, each speaker can be individually linked to enable separate processing for speakers with different serial numbers within a single line array.

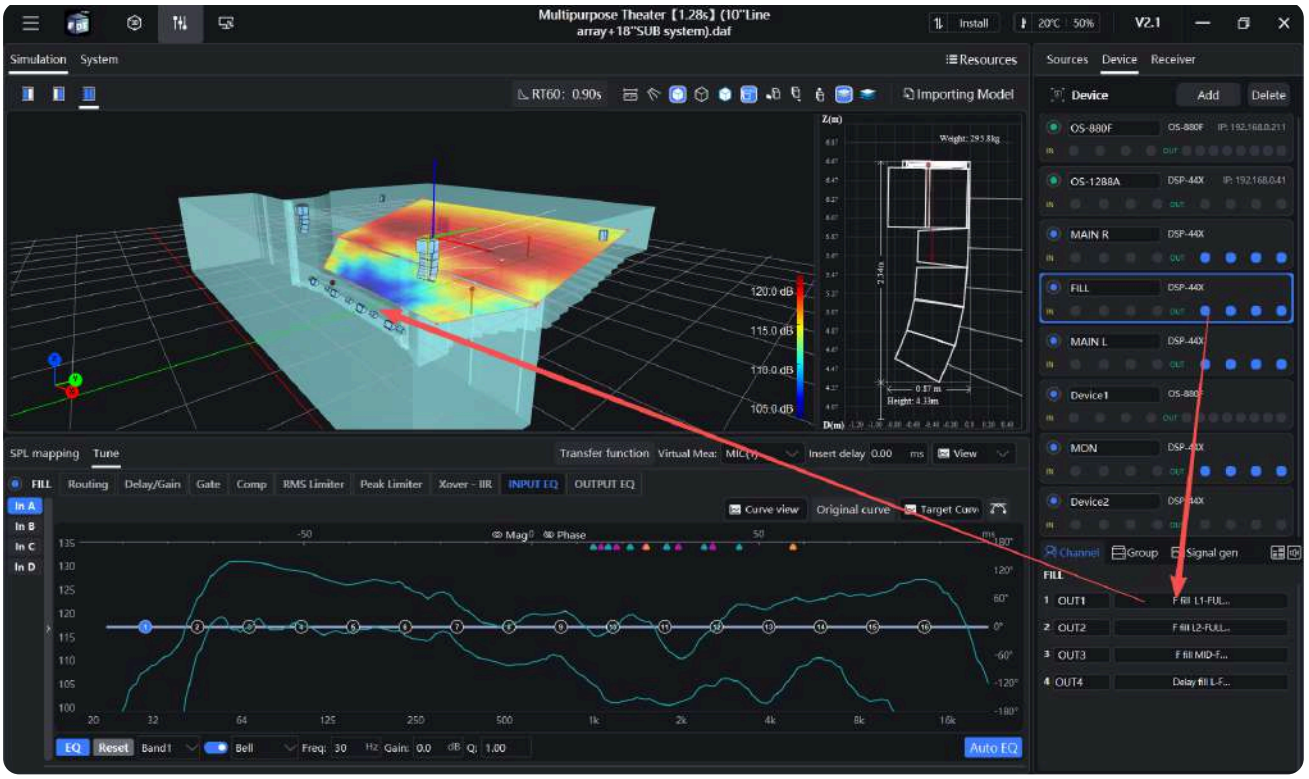


Figure 6-2: Assigning Sources to Virtual DSP Device Channels

6.3 DSP Device Processing

Select the DSP device to perform signal processing on the current DSP device within the Virtual Measurement Debugging tab of the simulation calculation window. The virtual DSP device provides identical processing capabilities to the actual online DSP device, enabling rapid synchronization of virtual device parameters directly to the real DSP device during field application debugging.

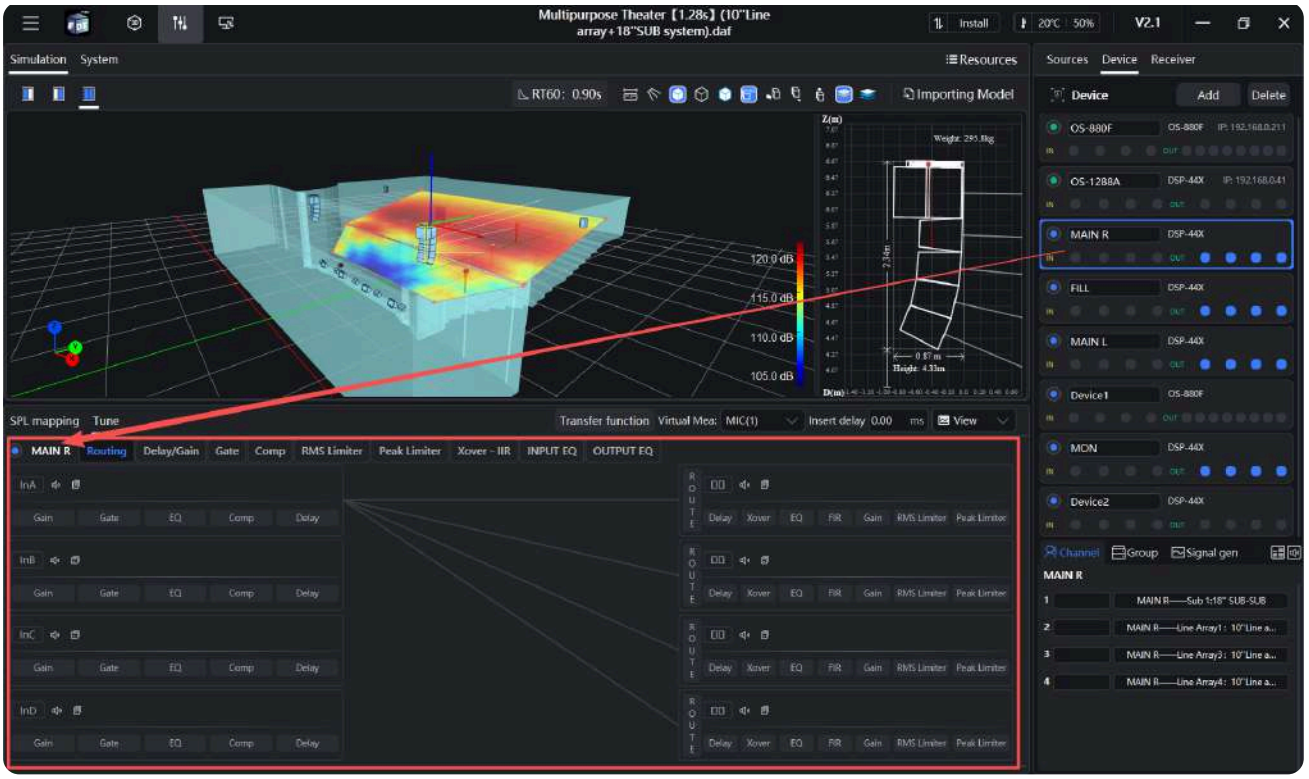


Figure 6-3 DSP Device Processing

6.3.1 Routing

On the Routing tab of the virtual DSP, you can matrix-connect any input to any output. Once connected, the parameter processing applied to both input and output will collectively affect the audio source linked to the channel. By routing an input channel to multiple output channels, you can apply uniform parameter processing to audio sources linked to those outputs during input channel processing. Clicking any channel's parameter processing module instantly navigates to its dedicated processing interface. This interface also allows configuration of common functions like parameter assistance and quick mute.

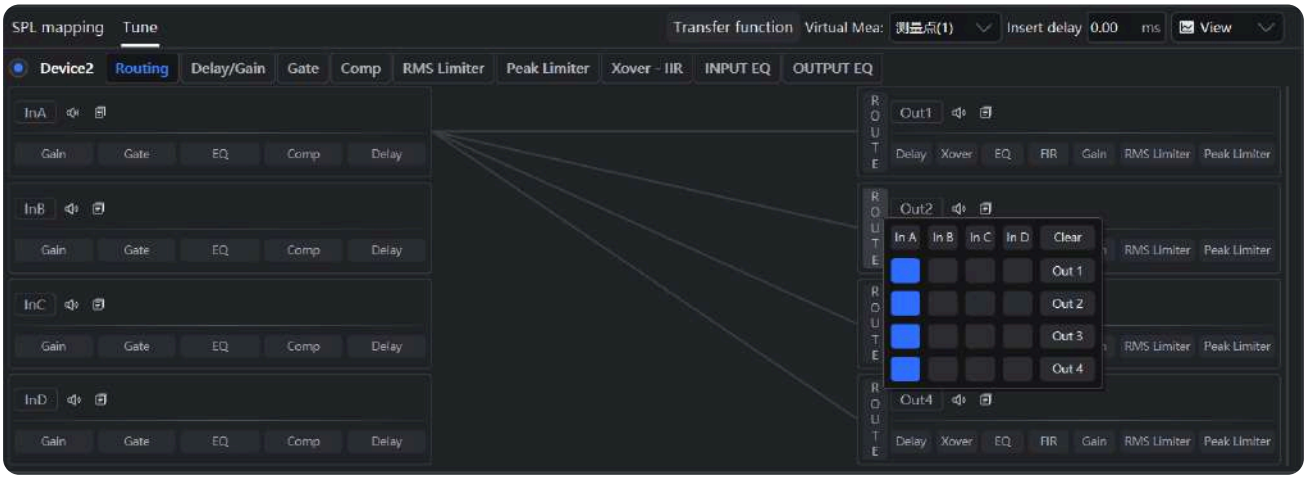


Figure 6-4 DSP Device Routing Interface

6.3.2 Delay and Gain

The Virtual DSP Delay Gain function page provides unified management of DSP input/output gain, delay, and polarity. This interface also displays the channel's total delay and total mute. Total delay and total mute represent the cumulative parameters resulting from the sum of the current channel's delay and gain plus the delay and gain of the group to which the channel belongs. If you notice discrepancies between the total delay and total mute values and the channel's current delay and gain settings, verify whether the channel has been assigned to a group and whether additional parameter processing has been applied within that group.

Figure 6-5 DSP Device Delay/Gain Page

6.3.3 Noise Gate

The virtual DSP provides an input channel noise gate processing module, which is intended solely for preprocessing purposes. Any adjustments made to its parameters will not affect the simulation results.

Figure 6-6 DSP Device Noise Gate Page

6.3.4 Compressor

The virtual DSP provides a channel signal compression processing module, which is intended solely for preprocessing. Adjustments made to its parameters do not affect the simulation calculation results.

Figure 6-7 DSP Device Compressor Page

6.3.5 RMS Limiter (Output)

The virtual DSP provides an output channel RMS limiter processing module, which is intended solely for preprocessing. Its parameters do not affect simulation results. You may preset limiter parameters based on the actual rated power of the connected sound source to save on-site configuration time.

Figure 6-8 DSP Device RMS Limiter Page

6.3.6 Peak Limiter (Output)

The virtual DSP provides an output channel peak limiter processing module. This module is intended solely for preprocessing; any adjusted parameters will not affect simulation results. You may preset limiter parameters based on the actual peak power of the linked sound source to save on-site configuration time.

Figure 6-9 DSP Device Peak Limiter Page

6.3.7 Crossovers (Output)

The virtual DSP's crossover interface provides an output channel crossover debugging interface for rapid crossover configuration. Crossover parameters will affect the final frequency response of the sound source connected to the current channel, thereby influencing simulation results.

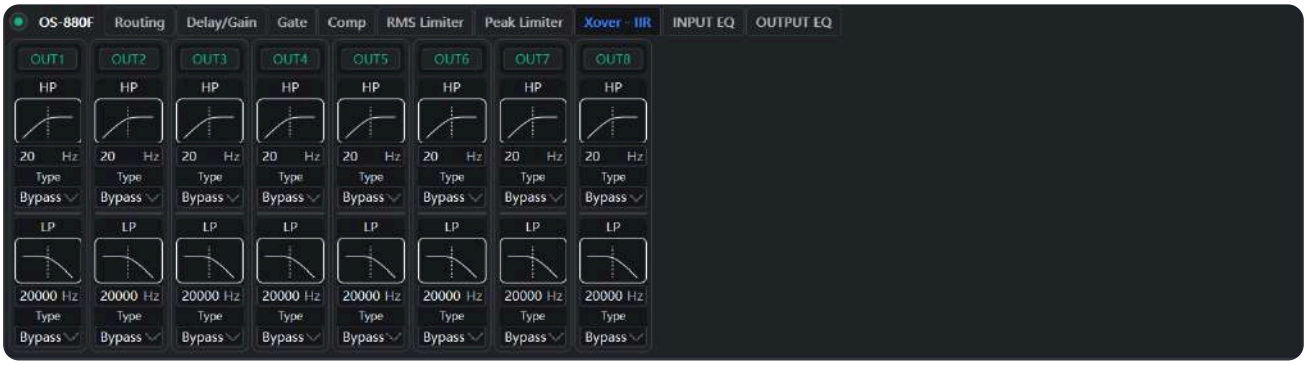


Figure 6-10 DSP Device Crossovers Page

6.3.8 Input Equalizer

Virtual DSP input equalizer supports equalization processing for each input channel. If a routing relationship exists between the current input channel and an output channel, the equalization results will also affect the audio source linked to the routed output channel.

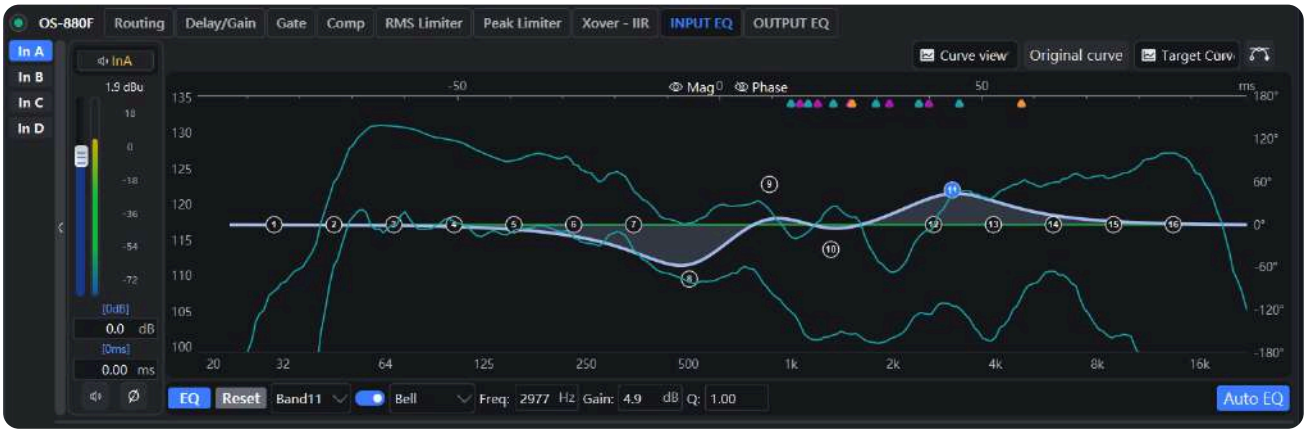


Figure 6-11 DSP Device Input Equalizer

6.3.9 Output Equalizer

Virtual DSP output equalizer supports equalization processing for each output channel, with the equalization results affecting the audio sources linked to that channel. Additionally, the output equalization interface provides crossover processing for the current channel, whose parameters synchronize with the crossover overview interface.

Figure 6-12 DSP Device Output Equalizer

6.4 Channel Grouping

DT-PRO Software Platform DSP devices support channel grouping. Through group assignment, multiple input channels or multiple output channels can be added to the same group. Adjusting group parameters allows additional parameter processing to be uniformly applied to channels within the current group, building upon their original parameter settings. This is highly suitable for speaker zone processing and unified management. Access the Group Management module via the Device Channel/Group Management tab below the device list. Here, you can create multiple groups for speaker zoning, unified management, and debugging.

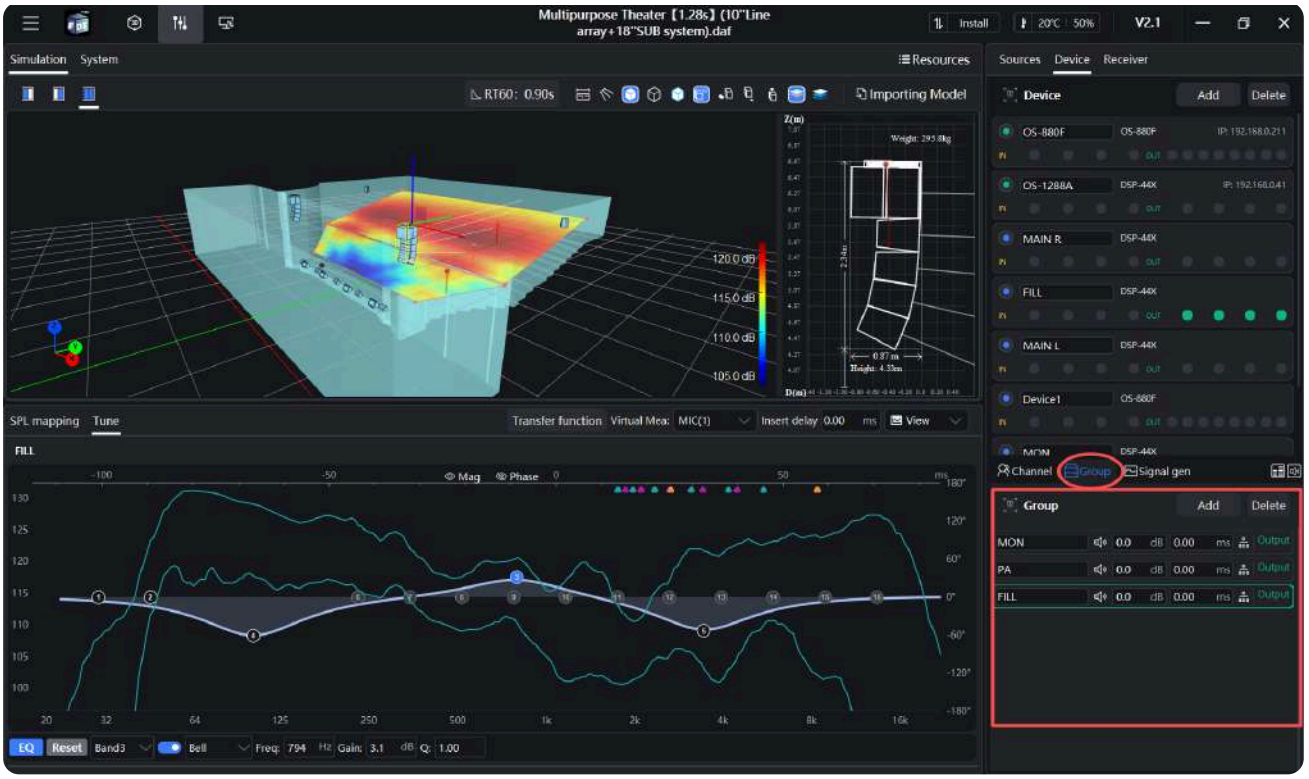


Figure 6-17 Group Management

6.4.1 Assign channels to the group

In the Group Management module, groups without assigned channels will display as "U/A", and their parameter settings will not affect any channels.

Adding channels to a group: Click the Assign button for the corresponding group to enter group assignment mode. All device channels in the device list will become clickable. Click the desired device channel to add it to the group.

Input Group: In assignment mode, if a group prioritizes input channels, it becomes an input channel group. Only input channels can be added to this group, while output channels become unclickable. The group status changes from "U/A" to "Input".

Output Grouping: During assignment, if a group prioritizes output channels, it becomes an output channel grouping. Only output channels can be added to this group, while input channels become unclickable. The group status changes from "U/A" to "Output".

Figure 6-14 Entering Grouping Assignment Mode

Figure 6-15 Assigning Input Channels to Group

Figure 6-16 Assigning Output Channels to Group

6.4.2 Debugging Grouping

The Grouping Module provides Mute/Gain/Delay/EQ functions, with adjustments affecting all channels within the group. The EQ frequency points within a group are disabled by default. Select the corresponding EQ frequency point to enable it for normal operation. In practical applications, you can assign different zones or function-specific speaker channels to distinct groups—such as main PA, subwoofers, fill speakers, or monitors—for more efficient management of different areas. Additionally, selecting a group will highlight all channels within that group in the device list.

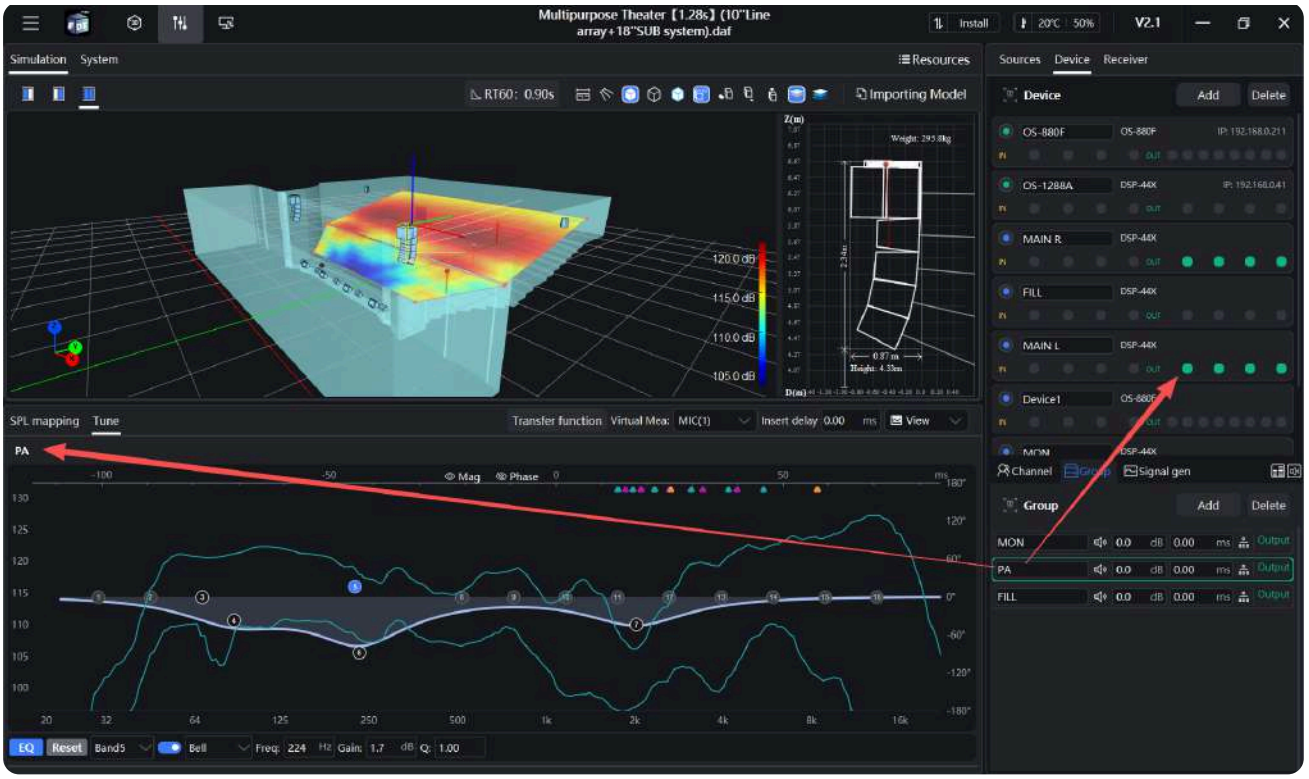


Figure 6-17 Group Debugging

7.Optimize the acoustic field using virtual measurements in DT-PRO software

In DT-PRO Software, virtual measurement points can be added to obtain acoustic metric data at specific locations. This includes the frequency response curves of each sound source at the measurement point, the phase curves of each sound source, the propagation time of each sound source, and the combined total frequency response of all active sound sources. By integrating virtual DSP processing, the software enables virtual acoustic field optimization for simulation projects.

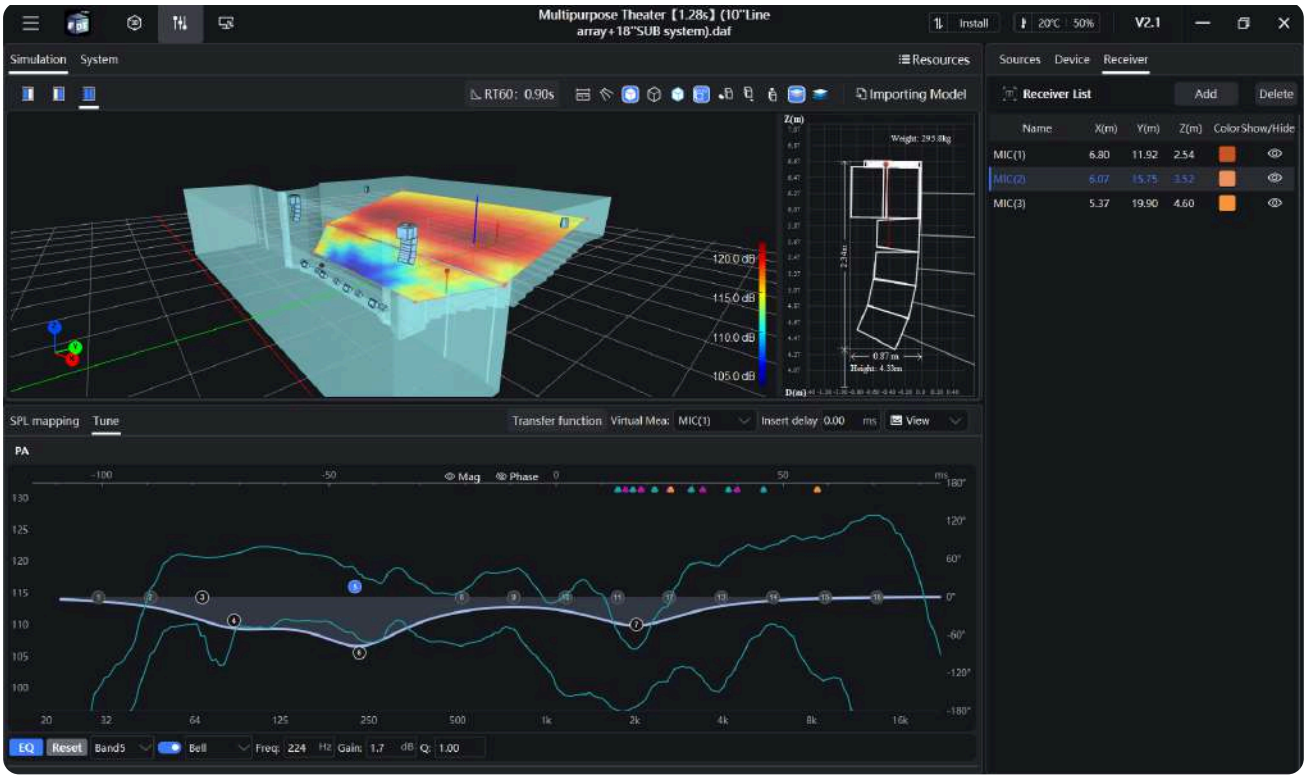


Figure 7-1 Optimizing the Acoustic Field Using Virtual Measurements in DT-PRO

7.1 Adding a Virtual Receiver in the Venue

On the Virtual Debugging page, within the Receiver tab, you can add multiple receivers to the venue. You can also set the receiver color, which will simultaneously apply to the display of the receiver's sound source overlay frequency response. Receivers will appear as microphone icons in the project view.

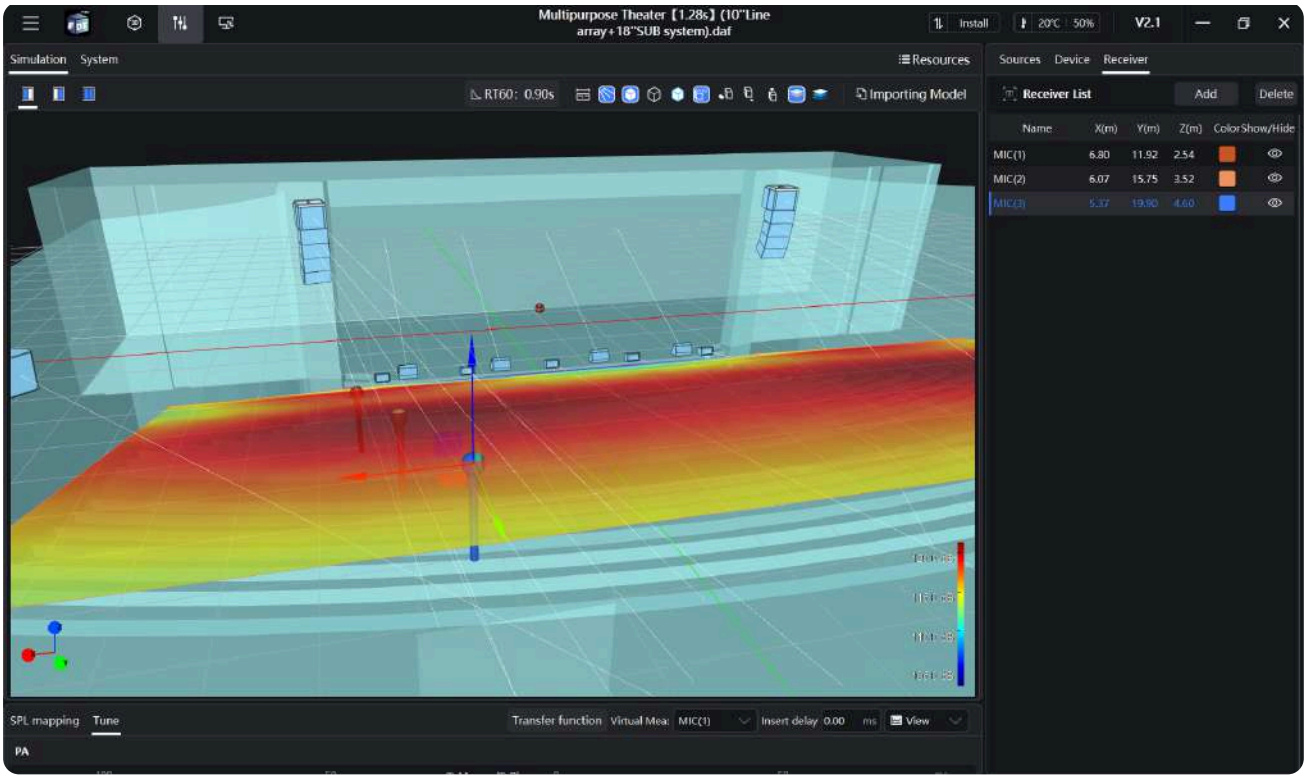


Figure 7-2 Adding a Virtual Receiver in the Venue

7.2 Displaying and Hiding Virtual Measurement Results

After adding a receiver, the equalization debugging interface for any device channel or group will display the frequency response curves, phase curves, and transmission time for each sound source at the receiver location, along with the combined frequency response of all active sound sources at that receiver. You can use the view bar to show or hide specific curves. Additionally, you can mute sound sources (including muting the source itself, muting the channel it's connected to, or muting the group it belongs to) to exclude muted sources from calculations.

Figure 7-3 Displaying and Hiding Virtual Measurement Results

7.3 Switching the measurement curve style and receiver

Within the virtual measurement window, different types of measurement data are displayed in distinct formats. Additionally, the receiver switch control allows users to toggle between displaying measurement data from different receivers.

Sound source frequency response/phase: Displayed as a curve with a width of 1 pixel, where the curve color corresponds to the color defined for the sound source;

Overlay frequency response: Displayed as a curve with a width of 3 pixels, where the curve color corresponds to the color defined for the receiver;

Transmission Time: Displayed on the timeline at the top of the window; hover to view specific transmission times.

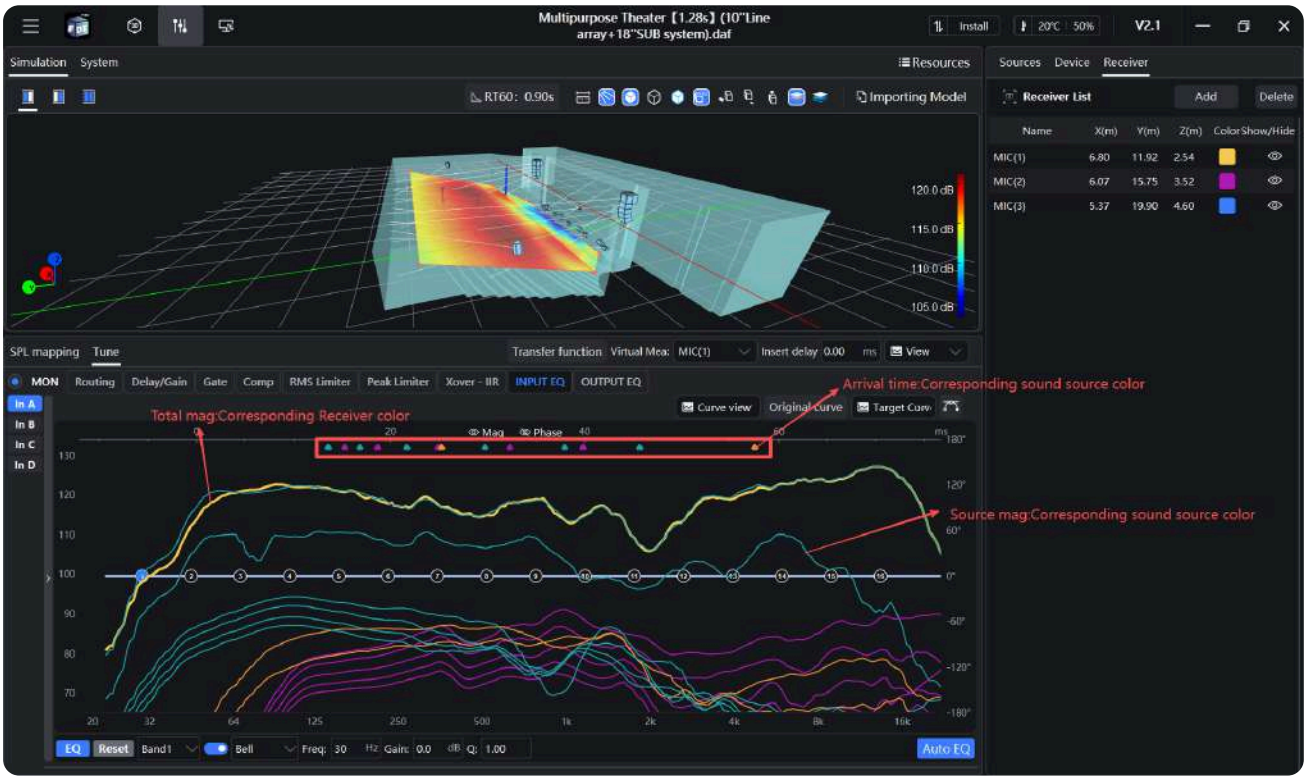


Figure 7-4 Display of Measurement Curves and Receiver Switching

7.4 Virtual Measurement Delay Compensation

In the virtual measurement debugging module, a delay compensation feature is available. Once delay compensation is enabled, the transmission time of all sound sources will be reduced by the compensation value. If you need to designate a specific speaker as the reference sound source (0 delay/original phase), set its initial transmission time as the compensation value. This will set the reference sound source's transmission time to 0ms, maintaining its original phase curve. Simultaneously, the transmission time for all other speakers will be reduced by this compensation value. The transmission time for the remaining speakers will then represent the time difference relative to the current reference sound source.

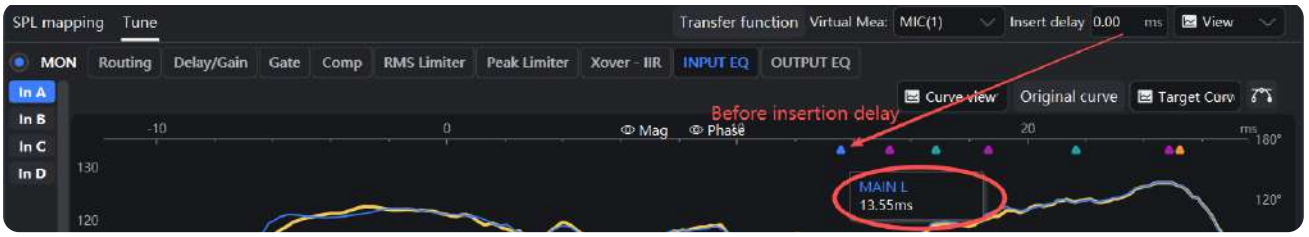


Figure 7-5: Transmission Delay of Source Before Virtual Measurement Delay Compensation

Figure 7-6 Transmission Delay of Source After Virtual Measurement Delay Compensation

7.5 Optimize the virtual measurement frequency response curve

In DT-PRO software, to optimize the frequency response curve of a specific sound source at a receiver location, you can adjust the equalizer of the output channel associated with that sound source, the equalizer of the input channel to which the output channel is routed, or the equalizer of the group containing the channel associated with the sound source. After debugging, the frequency response curve will change in real time, and the distribution of the simulated sound pressure level results will change synchronously.

Note: The frequency response curve of a line array sound source represents the combined frequency response of all speakers within a single line array group. If speakers within the line array group are linked to multiple output channels, the effect of adjusting the EQ on a single channel may not be sufficiently noticeable on the overall frequency response curve of that line array sound source. This is a normal physical phenomenon.

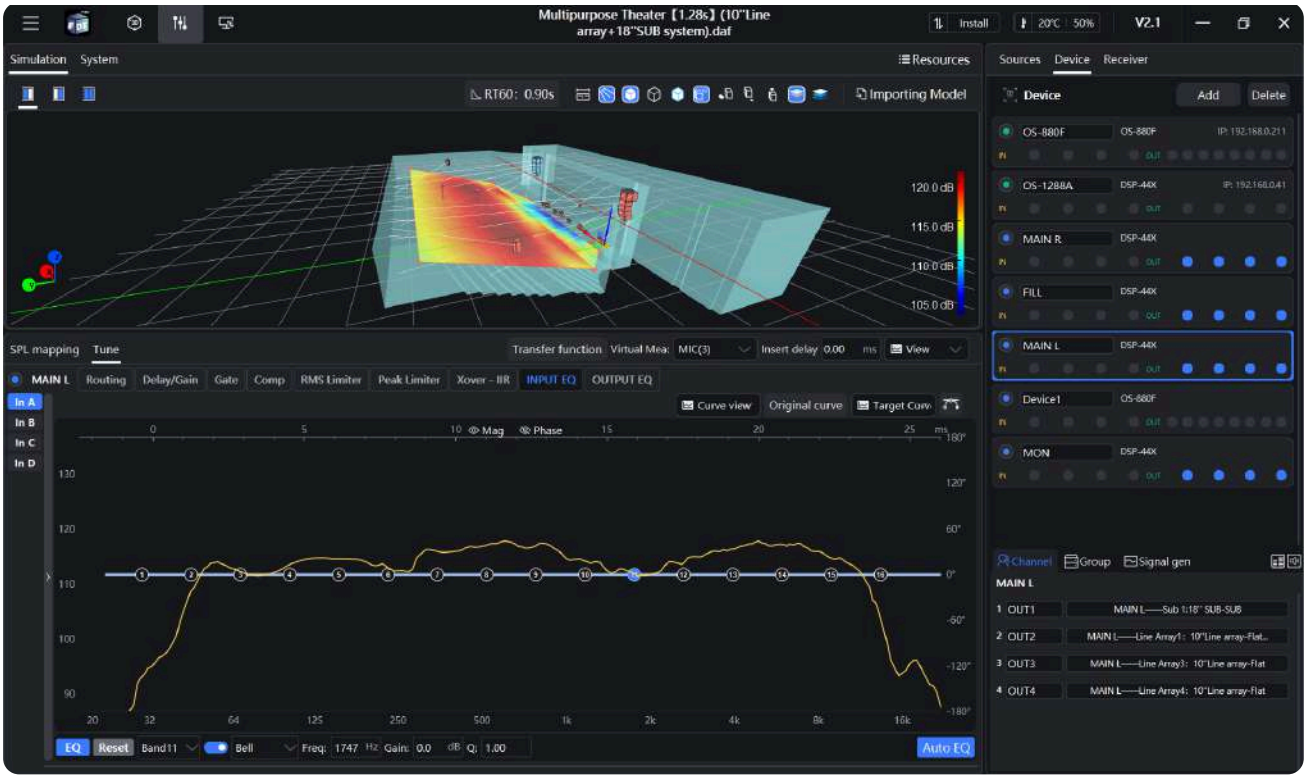


Figure 7-7: Frequency Response Curve of Main L Before EQ Correction at MIC 3

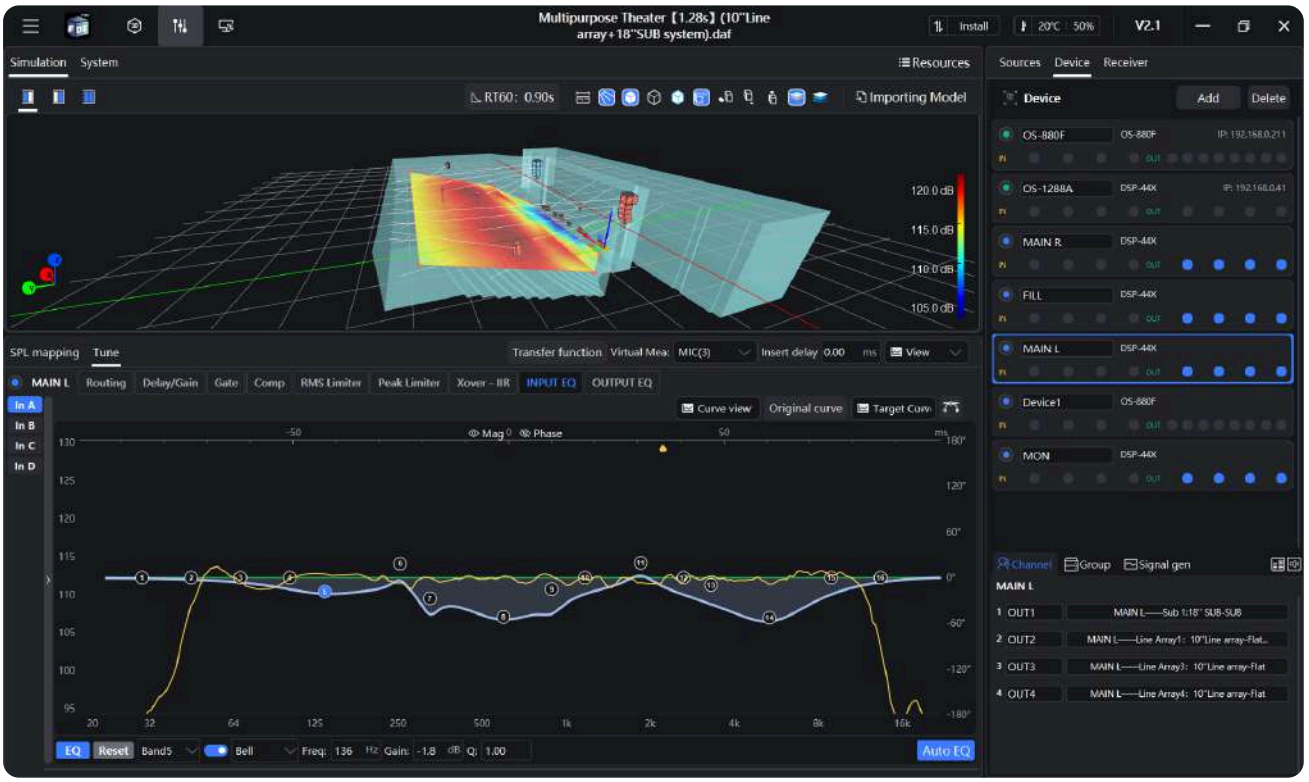


Figure 7-7: Frequency Response Curve of Main L After EQ Correction at MIC 3

7.6 Utilizing virtual measurement to correct transmission time differences

In DT-PRO software, to correct the transmission time differences between various sound sources at a specific receiver, we can observe the transmission times of each sound source on the transmission time axis. Adjustments can be made to the delay of the output channel associated with the sound source, the delay of the input channel routed to the output channel, and the delay of the group containing the sound source's associated channel. This process corrects the transmission time differences between different sound sources at the same receiver.

Note 1: The transmission time of a line array sound source is determined collectively by all speakers within a single line array group. If speakers within the line array group are linked to multiple output channels, adjusting the delay of a single channel may not significantly affect the overall transmission time of that line array sound source. This is a normal physical phenomenon. It is recommended to uniformly adjust the delays of all channels or use group settings for adjustment.

Note 2: Using the delay compensation function to set the transmission time of the reference speaker (used during delay calibration) to 0ms allows for faster acquisition of transmission time differences across speakers.

Note 3: Clicking the dropdown button next to a device in the device list expands quick parameter controls. You can adjust the delay via quick controls while simultaneously viewing changes in transmission time.

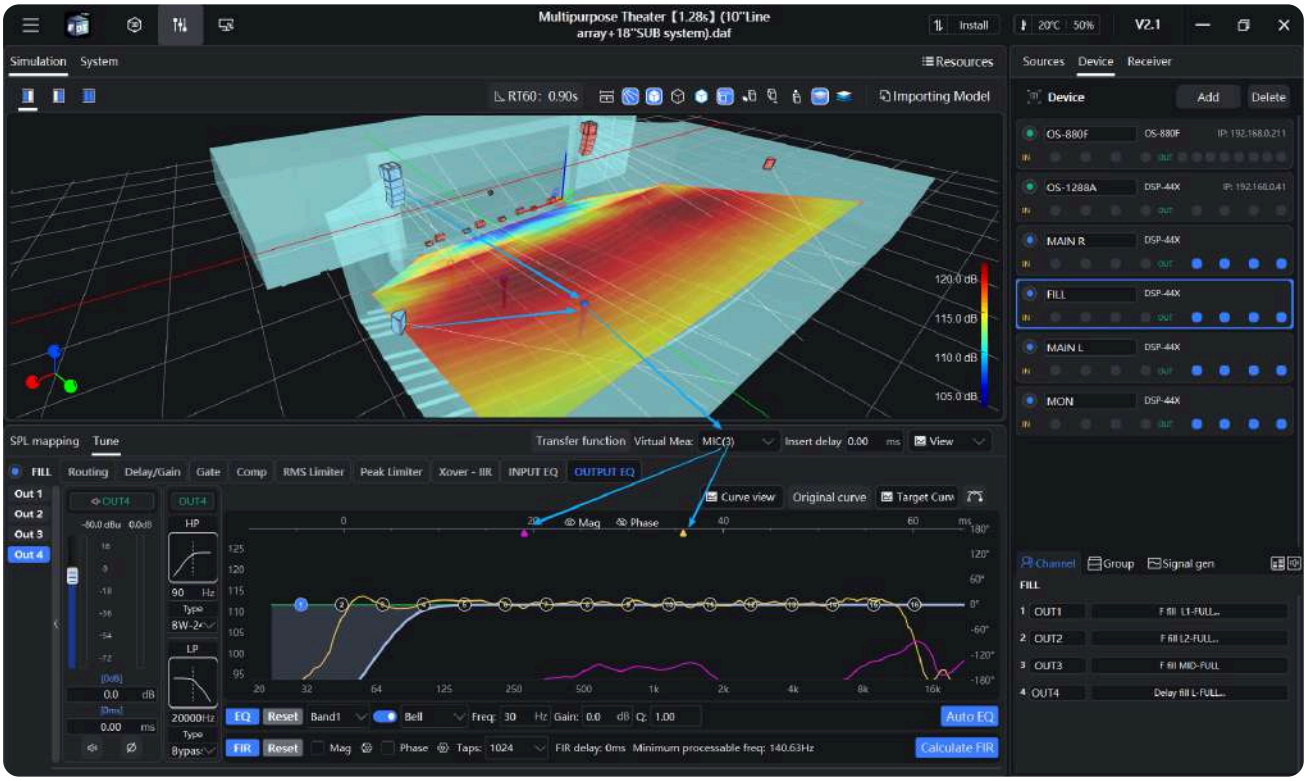


Figure 7-9: Significant transmission time difference between Main L and Delay Fill L when no delay correction is applied at MIC3.

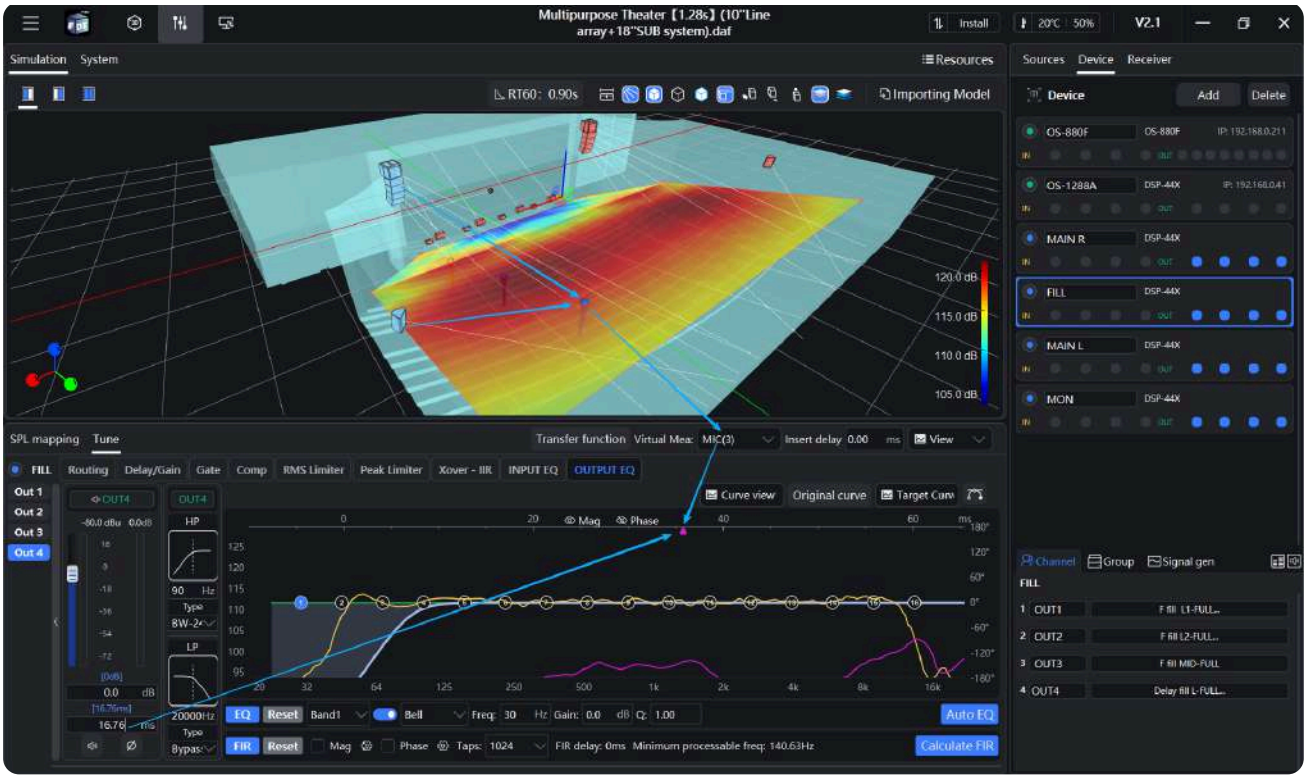


Figure 7-10 After adding delay to the DSP channel associated with the Delay Fill L, the transmission times of the main L and Delay Fill L overlap as measured at Receiver 3.

7.7 Utilizing virtual measurements to couple full-frequency with ultra-low phase

In DT-PRO, to achieve phase coupling between a subwoofer and a full-range speaker at the receiver end, we can observe their phase curves and adjust the corresponding speaker delay/polarity. This ensures the phase curves in the overlapping region of their frequency response curves align closely. Once aligned, the combined frequency response will exhibit a superimposed state across the covered frequencies.

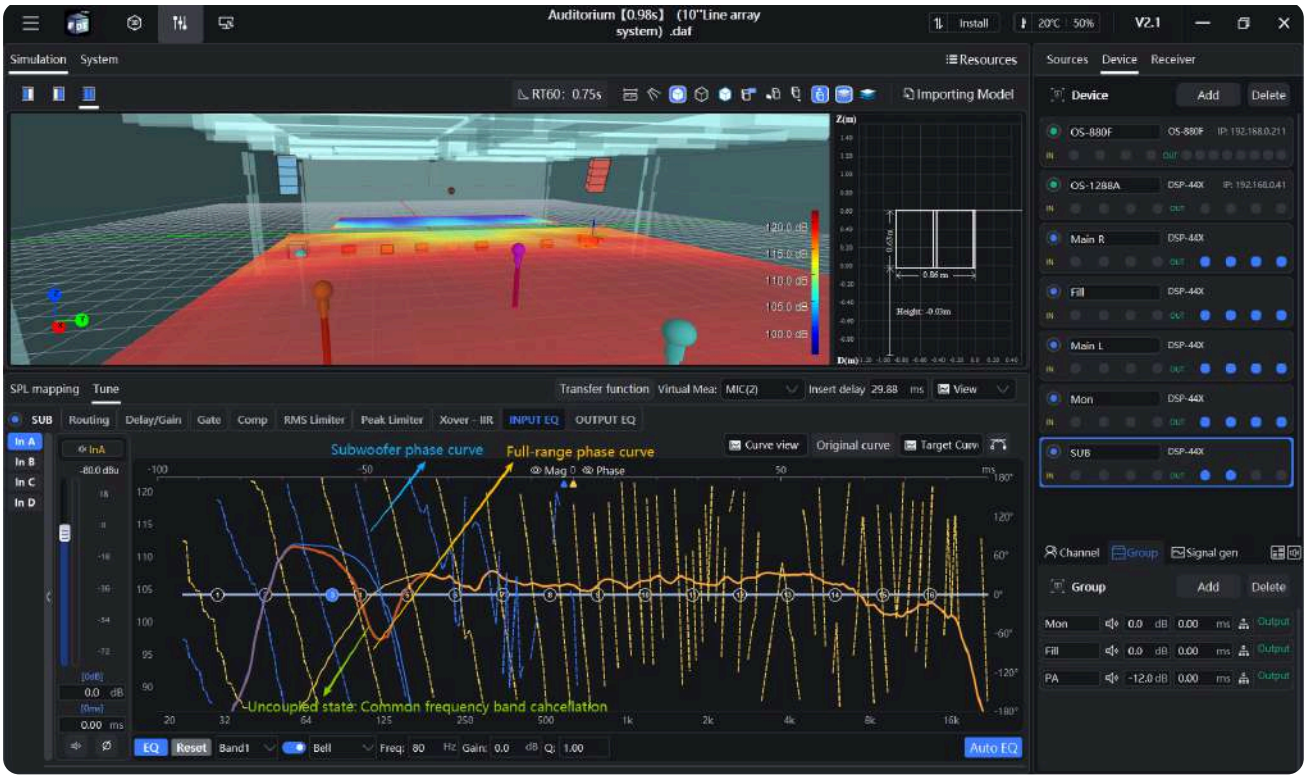


Figure 7-11: When the subwoofer and full-range speaker phase curves are uncoupled, the overlapping frequency response bands exhibit a canceling effect.

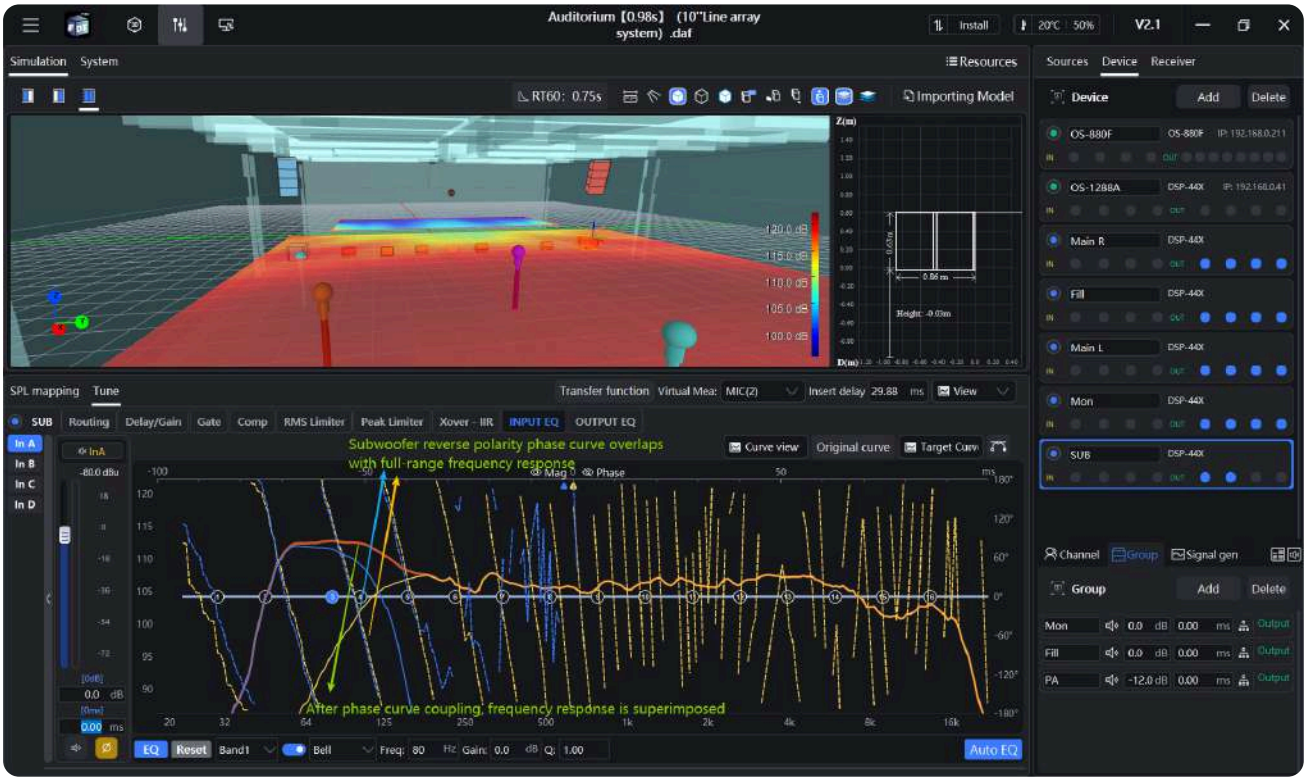


Figure 7-12: After applying reverse polarity to achieve phase alignment between the subwoofer and full-range speaker, the frequency response within the overlapping frequency band exhibits a superposition effect.state.

8.Online management of DSP devices in DT-PRO software

In DT-PRO Software, in addition to acoustic simulation and virtual measurement debugging, DSP device management and debugging functions are also provided. You can access the device management module via the navigation bar. Here, you can view all added virtual devices, virtual sound sources, and groups, as well as search for online DSP devices on the network and perform necessary debugging.

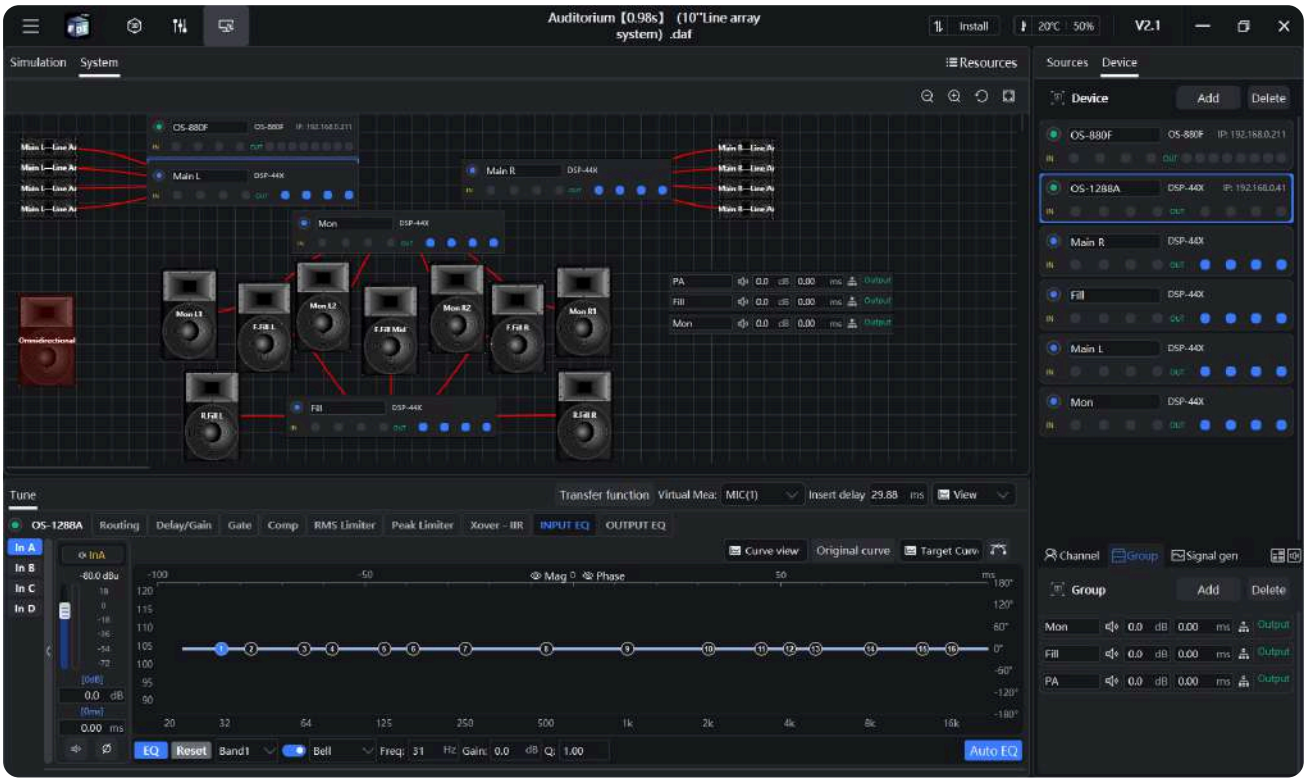


Figure 8-1 DT-PRO Software Device Management

8.1 Search for online devices

When online devices are connected to the same local area network as this computer, they will be automatically detected and displayed in the device list, with online devices indicated by a green icon.

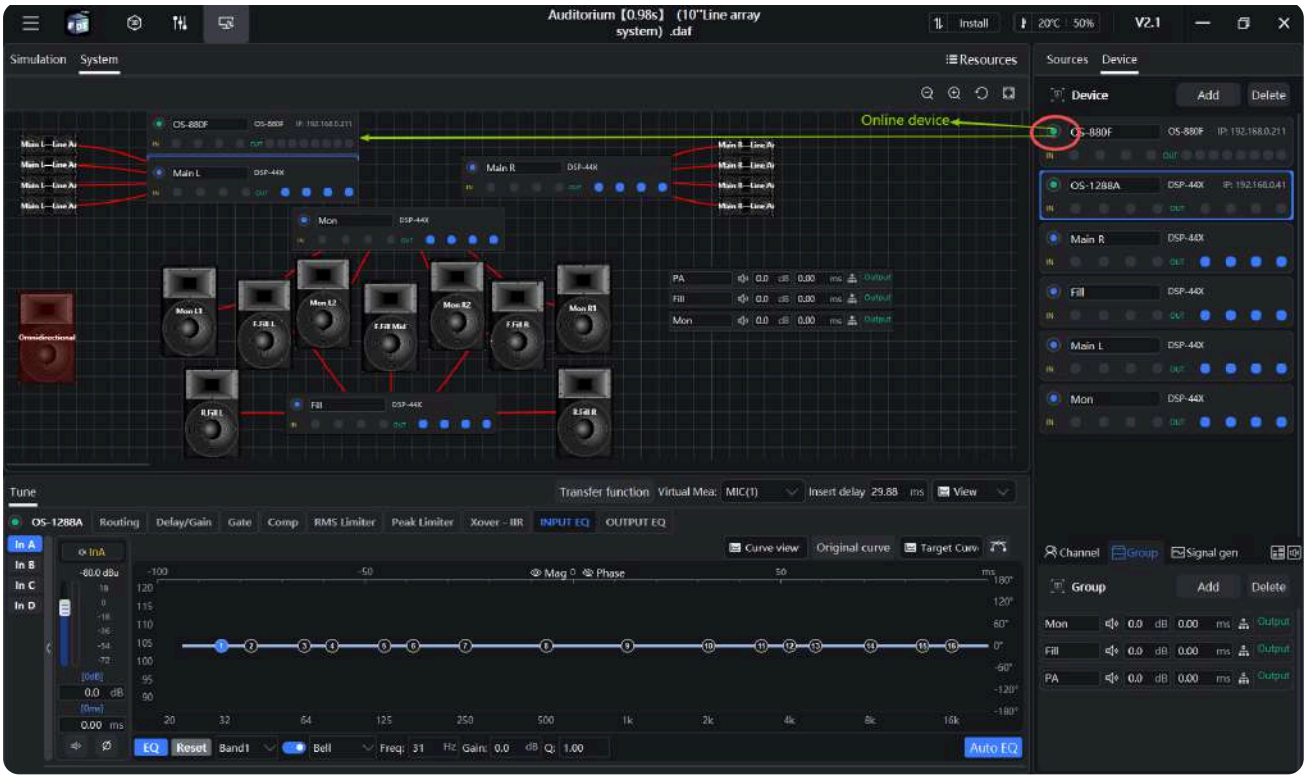


Figure 8-2 The device list page automatically searches for and displays online devices.

8.2 Synchronize virtual device parameters to online devices

Through the Device Management canvas page, you can quickly synchronize pre-adjusted virtual device parameters to online devices. DT-PRO offers two synchronization methods:

8.2.1 Drag the device to synchronize parameters

In the Engineering Management Canvas area, drag a virtual device onto an online device or drag an online device onto a virtual device. The word “Synchronization” will appear on the device. Release the mouse button to quickly synchronize the parameters from the virtual device to the online device.

Note: Using this method to synchronize parameters will completely map all configurations from the virtual device to the online device, including device name, DSP parameters, device grouping, etc. At the same time, the original virtual device will disappear.

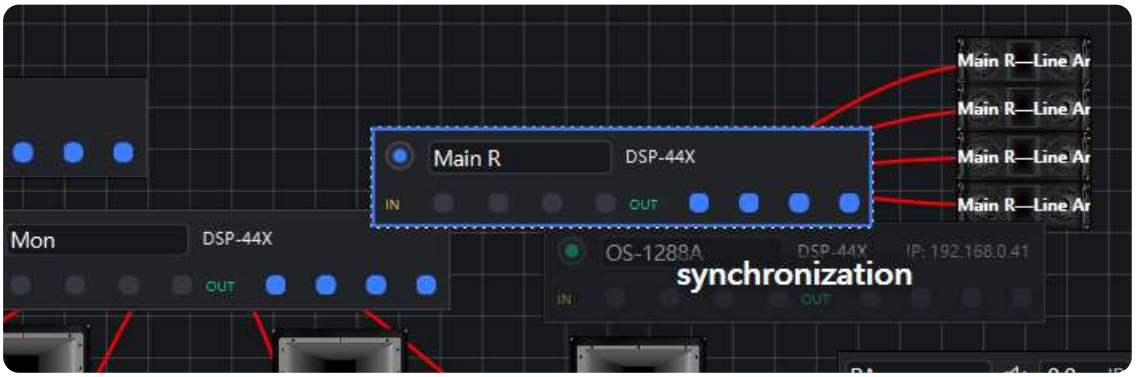


Figure 8-3 Drag Device Synchronization Parameters

8.2.2 Copy Device Parameters

Within the Engineering Management Canvas area, you can also right-click a device to copy its current parameters and paste them to other devices of the same model.

Note: The device parameter copy function only replicates the device's own DSP parameters to other devices. It does not alter the target device's name, channel connections to sound sources, or grouping status.

Figure 8-4 Copying Device Parameters

8.3 Scintillation Device

Right-click on the online device to bring up the menu, then select “Scintillation Device.” The device's touchscreen display will flash to help you quickly locate its position within the cabinet.

Figure 8-5 Scintillation Device

8.4 Device Notes

Right-click on an online device to bring up the context menu, then select “Device Notes” to add comments about potential faults or other information. These notes will be synchronized to the device's touchscreen display.

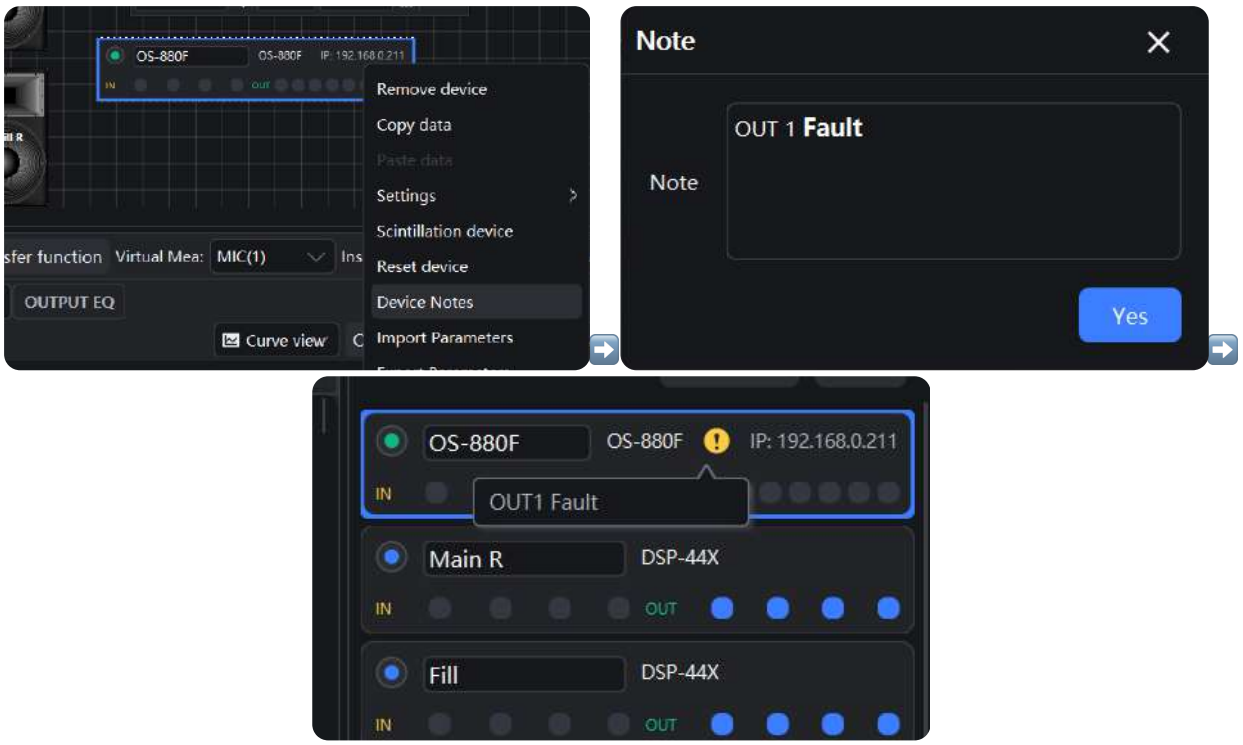


Figure 8-6 Adding Annotations to Equipment

8.5 IP Settings

Right-click the online device to bring up the menu, then select “Settings > IP Settings” to modify the device's IP address.

Note: Changing the device's IP address to a different network segment may cause the device to go offline. You can re-search for the device by manually modifying its IP address on the device's touchscreen to match the new network segment.

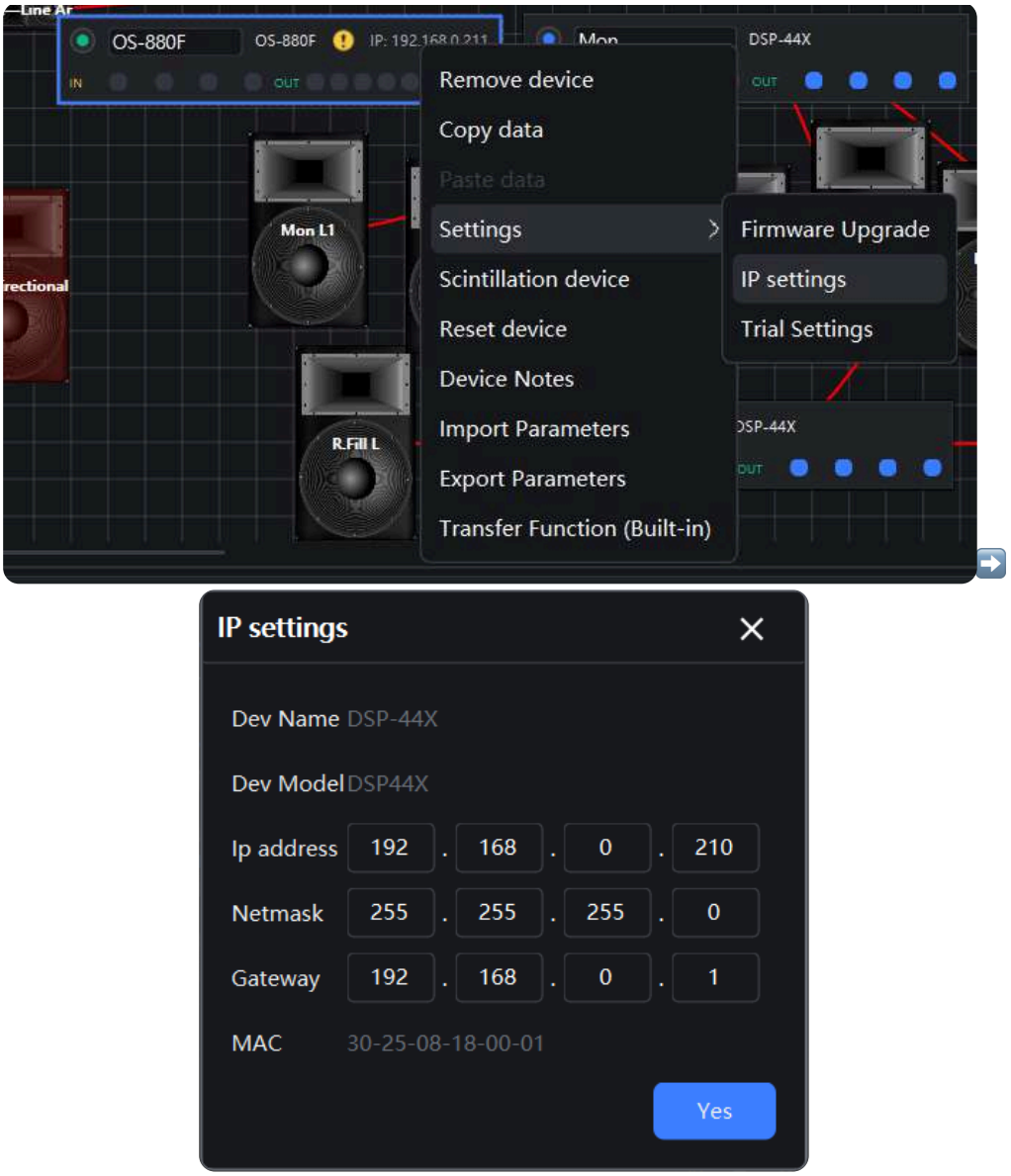


Figure 8-7 Setting the IP Address for the Device

8.6 Trial Configuration

Right-click an online device to open its configuration menu. Select “Settings - Trial Settings” to configure the device's cumulative operating time and maximum power cycle count limits. When either the operating duration or power cycle count reaches any preset threshold, the device will be locked. Locked devices remain discoverable but are muted and cannot be debugged. You may re-enter Trial Settings to reset or cancel the trial.

Note: Modifying trial settings requires administrator password verification.

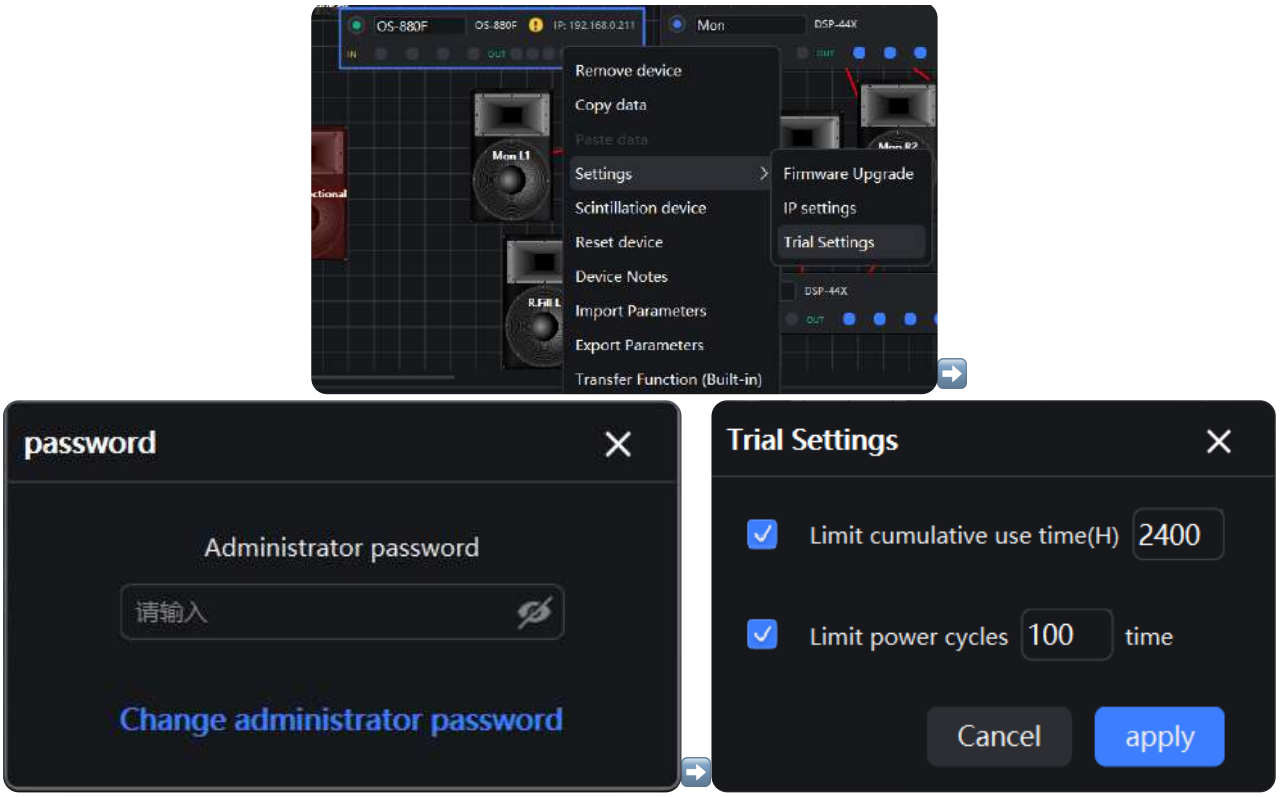


Figure 8-8 Setting the Device to Trial Mode

9.Online debugging of DSP devices in DT-PRO

In DT-PRO Software, online DSP devices provide equivalent processing capabilities to virtual devices, including channel processing and group processing functions. For detailed module descriptions, refer to **6.3** DSP Device Processing.

Online devices and virtual devices can be added to the same group. Additionally, the online debugging module now includes transfer function measurement capabilities and automatic equalization processing.

9.1 Transfer Function Measurement

Click “Transfer Function Measurement” in the device debugging window to access the transfer function measurement interface. By connecting an external sound card device, you can perform frequency response curve and phase curve measurements essential for system debugging, as well as calculate phase delay. Additionally, you can use the pin-to-top function in the upper-right corner of the window to keep the measurement interface always on top. This allows you to view real-time changes in results while adjusting debugging parameters.

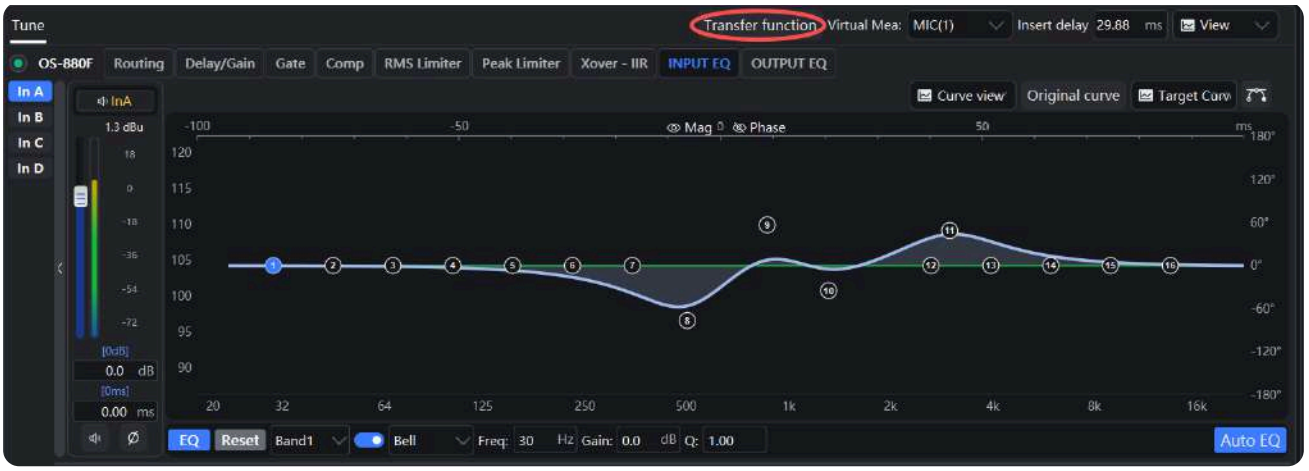


Figure 9-1 Entering Transfer Function Measurement

Figure 9-2 Transfer Function Measurement Window

9.2 Automatic equalization processing

The online device provides an automatic equalization processing module. Through this module, you can quickly generate EQ tuning parameters based on the imported raw frequency response curve and the set target frequency response curve, and apply them automatically.

9.2.1 Configure automatic equalization of the raw curve

Click the raw curve at the top of the equalization debugging window. In the dropdown menu that appears, you can select “Import from local path” to use a curve with the *.etfx extension as the automatic equalization raw curve. Alternatively, you can click “Select measurement curve” to

choose a curve from the transfer function measurement window as the raw curve. The raw curve will be displayed in orange within the debugging window.

Figure 9-3 Original Curve for Automatic Equalization Configuration

9.2.2 Configure the automatic equalization target curve

9.2.2.1 Select target curve

Click the target curve above the equalization debugging window to select a curve from the dropdown menu as the target curve for automatic equalization calculations. The target curve will be displayed in green within the debugging window. In addition to the built-in target curves, you can click the “Edit” button to the right of the target curve to access the target curve editing window, where you can create, edit, or import new target curves.

Figure 9-4 Target Curve for Automatic Equalization Configuration

9.2.2.2 Creating and Editing Target Curves

Click “Edit” at the top of the equalization debugging window to enter the target curve editing interface. Built-in target curves cannot be edited or deleted. However, you may add new target curves or import existing ones. On the editing page, you can independently adjust the amplitude and phase of each target curve. Checked target curves will appear as options in the target curve selection dropdown menu.

Figure 9-5 Target Curve Magnitude Editing

Figure 9-6 Target Curve Phase Editing

9.3.Automatic Equilibrium Calculation

After configuring the desired source curve and target curve, click the “Auto EQ” button in the lower-right corner of the equalization debugging window. In the Auto EQ Configuration window, set the calculation constraints. The system will then automatically compute the EQ parameters required to correct the source curve to the target curve based on these conditions, while simultaneously displaying the predicted curve after EQ intervention.

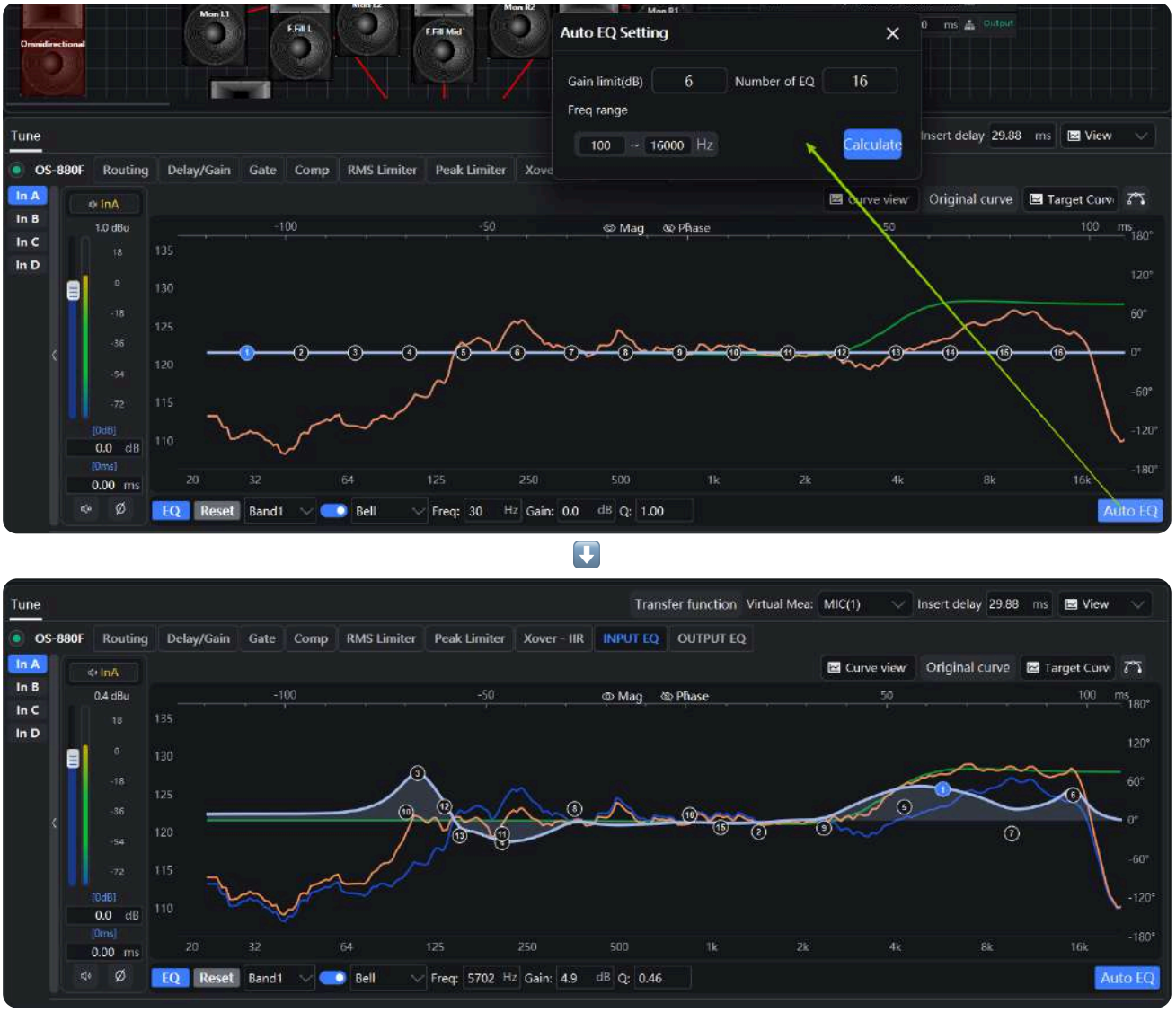


Figure 9-7 Configuration and Calculation of Automatic EQ

9.4.Signal Generator

All online DSP devices incorporate built-in signal generators. By switching to the “Signal Generator” option below the target editing area, you can generate various signal types and assign them to any input channel of an online device, thereby routing the signal to the corresponding channel.

Figure 9-8 Signal Generator

9.5.Saving and Recalling Device Output Channel preset

The online DSP device features a built-in preset library for output channels. Access the channel preset library by clicking the preset button for the corresponding output channel in the target editing area below or within the device routing window. You can save the current device channel's parameters as a preset to the library or load any preset parameters from the library onto the current channel.

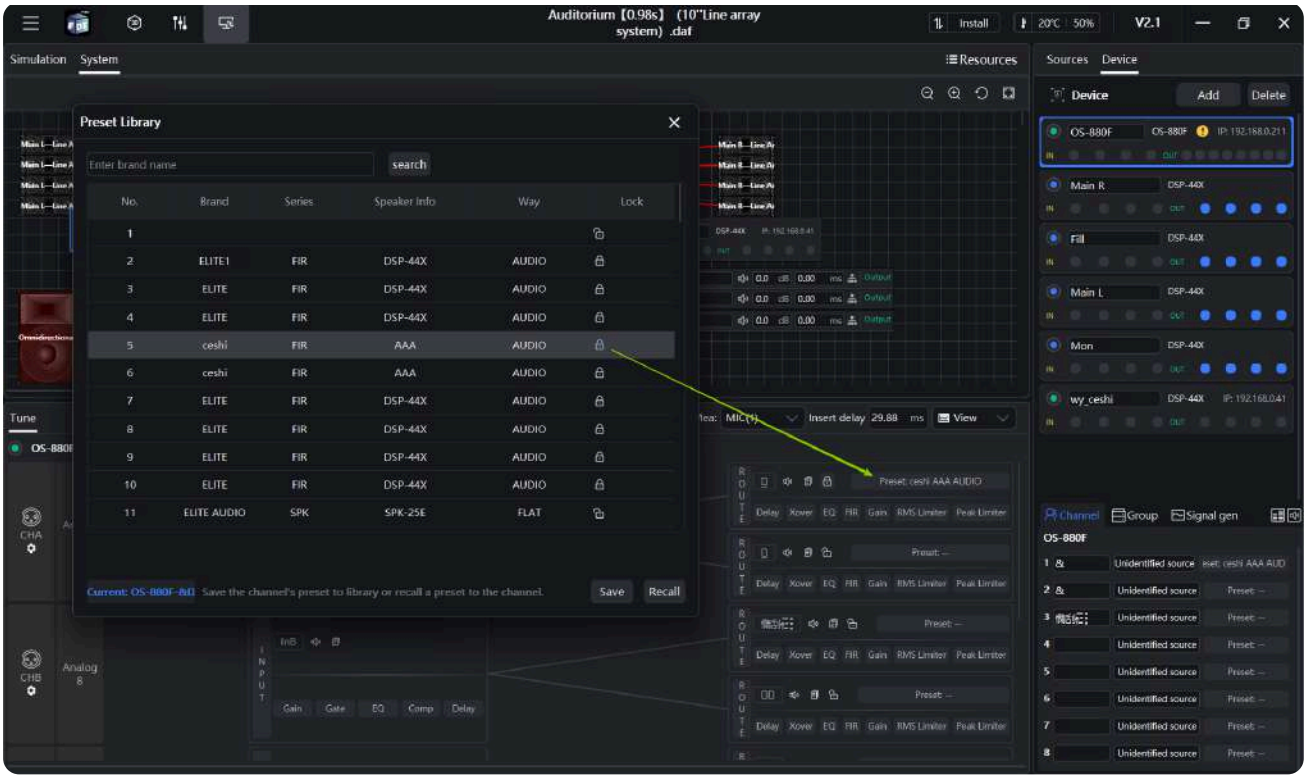


Figure 9-9 Saving and Recalling Channel Presets

9.6.Automatic FIR

After configuring the desired input and output curves, you can also perform automatic FIR calculation, which allows for setting relevant constraints and achieves significantly higher processing accuracy than IIR filters.

Figure 9-10 Configuration and Calculation of Automatic FIR