

**NEXO**

# **NEXO GEO Series**

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**GEOSOFT v1.0**

**HELP MANUAL**



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## INTRODUCTION

GEOSoft software is a MatLab based application. It processes measured speaker data with complex mathematical algorithms to assist the user in designing vertical GEO Tangent Arrays that provide even SPL throughout the depth of the audience. Due to the complexity of the interaction of multiple cabinets, it is simply not possible to reliably design curved vertical arrays without using the processing power of a computer to predict the optimum array structure for a given audience geometry. The design logic is far more complex than looking at a section drawing of the venue, measuring the overall angle needed to cover the audience from your cluster location, and dividing by 5degrees to determine the number of S805 cabinets you will need.

GEOSoft is an easy to use tool that will allow you to shape the energy leaving the cluster to fit your audience. In addition you will be able to predict the average and peak SPL of the system to ensure you have provided enough cabinets for the application.

**GEOSoft software is an acoustic prediction tool, and does not provide any information regarding safe assembly. Please refer to the Geo User Manual (Safety Section) for advice concerning Geo Tangent Array Assembly System installation and handling.**

Please check the NEXO Web Site ([www.nexo-sa.com](http://www.nexo-sa.com)) periodically for upgrades.

**MENU SELECTIONS**

**File Menu**



**Open**

Opens a mat file and loads a previously saved configuration.

**Save**

Saves the configuration.

**Save As**

Saves the configuration as *filename.mat* (approximate size : 2 ko).

**Export Bitmap**

Exports the window in a bitmap format (approximate size : 3000 ko).

**Export Tif**

Exports the window in a tif format (approximate size : 500 ko).

**Export Jpeg**

Exports the window in a jpeg format (approximate size : 180 ko).

**Printer Settings**

Configures the printer settings.

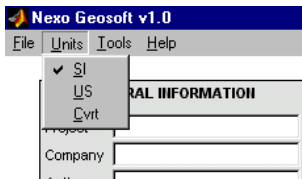
**Print**

Prints the window.

**Exit**

Ends the Geosoft session.

### Units Menu



#### SI

The project is defined in the metric (m) - kilogram (kg) units system; switching from US to SI does not change the Venue Geometry field values, and scales up the project.

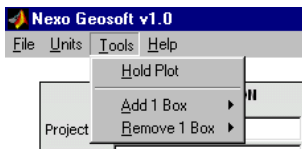
#### US

The project is defined in the feet (ft) - pound (Lb) units system; switching from SI to US does not change the Venue Geometry field values, and scales down the project.

#### Cvrt

Converts from SI units to US units, or from US units to SI units; the project remains the same, the Venue Geometry field values are changed accordingly.

### Tools Menu



#### Hold Plot

Holds the pressure plot in dashed lines until Hold Plot is released. The pressure plot is released if one of the Venue Geometry field values is edited.

#### Add 1 Box Top

Adds one S805 / T4805 at the top of the cluster; set angle value is 0.31 degree for S805, 0.12 degree for T4805.

#### Add 1 Box Bottom

Adds one S805 / T4805 at the bottom of the cluster; set angle value is 5 degrees.

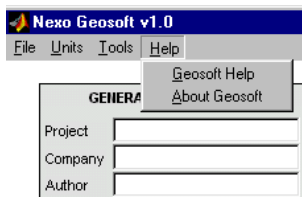
#### Remove 1 Box Top

Removes one S805 / T4805 at the top of the cluster.

#### Remove 1 Box Bottom

Removes one S805 / T4805 at the bottom of the cluster.

### Help Menu



#### Geosoft Help

Opens the GeoSoft Help Manual.

#### About Geosoft

GeoSoft Version and release date.

**FIELDS DESCRIPTION**

**General Information**

GENERAL INFORMATION	
Project	<input type="text"/>
Company	<input type="text"/>
Author	<input type="text"/>
Date	<input type="text"/>

**Project**

Enter the project name.

**Company**

Enter your company name.

**Author**

Enter your name.

**Date**

Enter the date (default date is your today).

**Cluster Design**

CLUSTER DESIGN	
Speaker Type	<input type="text" value="S8-Series"/>
Cluster Type	<input type="text" value="flown"/>
Quantity of S805	<input type="text" value="16"/>
Quantity of S830	<input type="text" value="1"/>

**Speaker Type**

S8-series (S805 / S830) or T-series (T4805 / T2815).

**Cluster Type**

Flown (Bumper is set at the top of the cluster, angles sum from top to bottom) or Stacked (Bumper is set at the bottom of the cluster, angles sum from bottom to top).

**Quantity of S805 (T4805)**

Sets S805 quantity (limited to 24 when flown, 8 when stacked) or T4805 quantity (limited to 40 when flown, 8 when stacked).

**Quantity of S830 (T2820)**

Sets S830 quantity (limited to 4 when flown, none when stacked) or T2815 quantity (limited to 8 when flown, none when stacked).

	CDD	Angle (deg)	Step
S805 # 1	<input type="checkbox"/>	-10	
S805 # 2	<input type="checkbox"/>	0.31	0.6 m
S805 # 3	<input type="checkbox"/>	0.50	2.4 m
S805 # 4	<input type="checkbox"/>	0.80	3.8 m
S805 # 5	<input type="checkbox"/>	1.25	4.9 m
S805 # 6	<input type="checkbox"/>	2.00	6.2 m
S805 # 7	<input type="checkbox"/>	3.15	7.4 m
S805 # 8	<input type="checkbox"/>	5.00	8.3 m
S830 # 1	<input type="checkbox"/>	17.5	15.1 m

**CDD**

Refers to the Geo waveguide Configuration Directivity Device (only in S8-series) ; horizontal coverage is 80 degrees when off, 120 degrees when on.

**Angle**

First cabinet angle – which is identical to the bumper angle - must be entered manually, and has is limited from –60 degrees to +30 degrees.

Choices between the cabinets are :

S805 to S805 : 0.31 - 0.50 - 0.80 – 1.25 – 2.00 – 3.15 – 5.00 degrees ;

S805 to S830 : 17.5 degrees ;

S830 to S830 : 17.5 -30 degrees ;

T4805 to T4805 : 0.12 – 0.20 - 0.31 - 0.50 - 0.80 – 1.25 – 2.00 – 3.15 – 5.00 degrees ;

T4805 to T2815 : 6.30 - 8.00 –10.00 degrees ;

T2815 to T2815 : 6.30 - 8.00 – 10.0 - 12.5 – 15.0 degrees.

**Step**

Non editable field ; gives the distance between targeted points on the audience.

	Angle (deg)	Step
T4805 # 1	-10	
T4805 # 2	0.12	0.4 m
T4805 # 3	0.20	0.6 m
T4805 # 4	0.31	2.2 m
T4805 # 5	0.50	2.8 m
T4805 # 6	0.80	3.6 m
T4805 # 7	1.25	4.6 m
T4805 # 8	2.00	5.9 m
T4805 # 9	3.15	7 m
T4805 #10	5.00	7.9 m
T2820 # 1	8.00	8.2 m
T2820 # 2	12.5	8 m
T2820 # 3	20.00	8 m

**Venue Geometry**

VENUE GEOMETRY							
Floor Slopes	6	Standing Audience					
	Bumper	Pt# 1	Pt# 2	Pt# 3	Pt# 4	Pt# 5	Pt# 6
X(depth)	-5	10	20	30	40	50	60
Z(height)	20	1	2	3	4	5	6

**Floor Slopes**

Number of slopes that can properly describe the venue side geometry. Can be set from 1 to 6.

**Audience**

Audience seating or standing for pressure mapping.

- Seated sets ear level at 1.20 meter (3.9 feet)
- Standing sets ear level at 1.60 meter (5.9 feet)

**Bumper X(depth)**

- When cluster flown, top of the first cabinet horizontal position in relation to point #0 of venue side geometry, set at X=0;
- When cluster stacked, bottom of the first cabinet horizontal position in relation to point #0 of venue side geometry, set at X=0.

**Bumper Z(height)**

- When cluster flown, top of the first cabinet vertical position in relation to point #0 of venue side geometry, set at Z=0 ;
- When cluster stacked, bottom of the first cabinet vertical position to point #0 of venue side geometry, set at Z=0.

**Points #1 to #6 X(depth)**

Venue Points #1 to #6 horizontal position in relation to point #0 of venue side geometry, set at X=0.

**Points #1 to #6 Z(depth)**

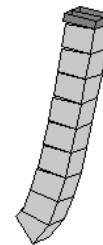
Venue Points #1 to #6 vertical position in relation to point #0 of venue side geometry, set at Z=0.

Important :decreasing slopes should be avoided as much as possible because of non-predicted and non-predictable shadowing effects.

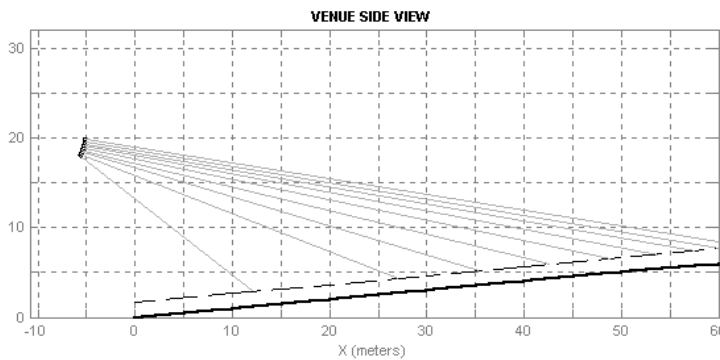
**Cluster view**

Simplified cluster drawing;  
 Non-operational when total cabinet quantity exceeds 24.

CLUSTER VIEW



**Venue Side view**

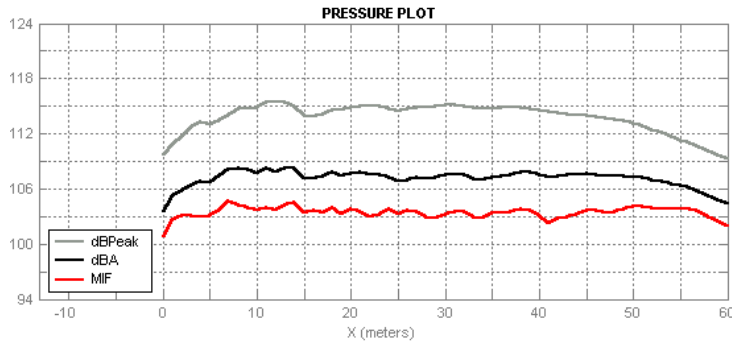


Shows cluster, venue side view and audience ear level (dashed line).



## Pressure Plot

Gives pressure level values at ear level over the audience zone;



Simulation conditions are as follows :

- test signal : IEC268 filtered Pink Noise ;
- free-field ;
- air absorption is not taken into account

Important : for distances superior to 80 meters (~260 feet), temperature, wind and hygrometry gradients do not allow to make any reliable prediction.

Provided curves are :

- dBPeak (grey curve), computed from 300 Hz to 3000 Hz ;
- dBA (black curve), computed from 63 Hz to 16 kHz A-weighted ;
- dBMIF (red curve), stands for dB "Make It Flat" ; for good results, this curve has to fit within 3 dB on the audience area.

Important : GeoSoft simulation does not take in to account any room contribution (floor reflection, reverberation...), nor another cluster contribution. Consequently, dBPeak and dBA values are pessimistic values that can easily increase from 3 to 6dB.

**GETTING STARTED**

**Obtain Dimensions of the Rigging Location / Audience Area**

All you need in order to enter accurate and complete information into GEOSoft is a simple dimensional cross section of the venue or outdoor audience area in front of the GEO cluster(s). Dimensions are referenced to a 0,0 point at the first seat of required coverage. You will need to enter:

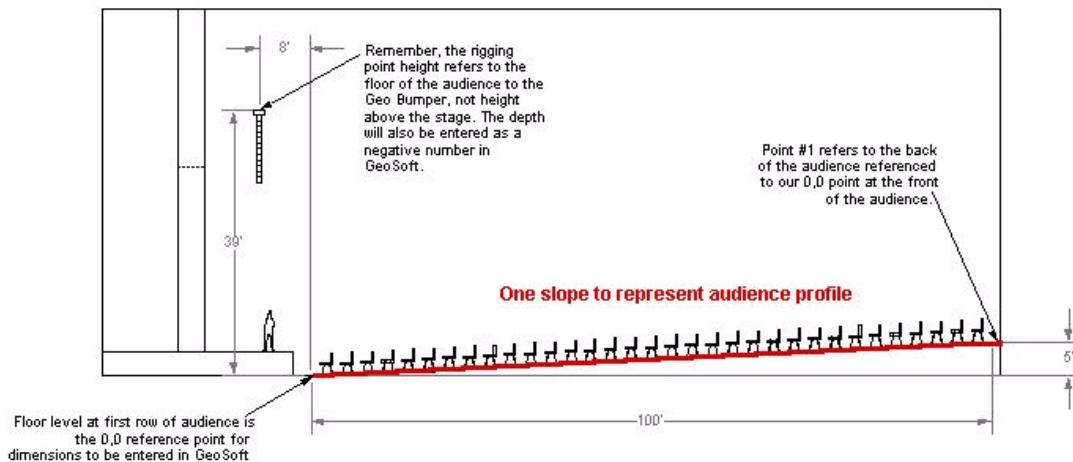
- the distance from the 0,0 point to a point directly below the front of the GEO cluster on the audience level;
- The height of and distance to the endpoints of slopes that provide a representation of the ground or floor profile of your audience area;
- The height of the GEO cluster (see note in the lower left corner of the following diagrams).

GEOSoft defines the “rigging point” as the top front of the GEO Bumper. This often means that a negative number is entered, since the 0,0 point is between the cluster and most of the audience. In the three following examples, the Rigging Point would have an X (depth) value of -8’ and a Z (height) value of 39’. The intended coverage area starts at 0,0.

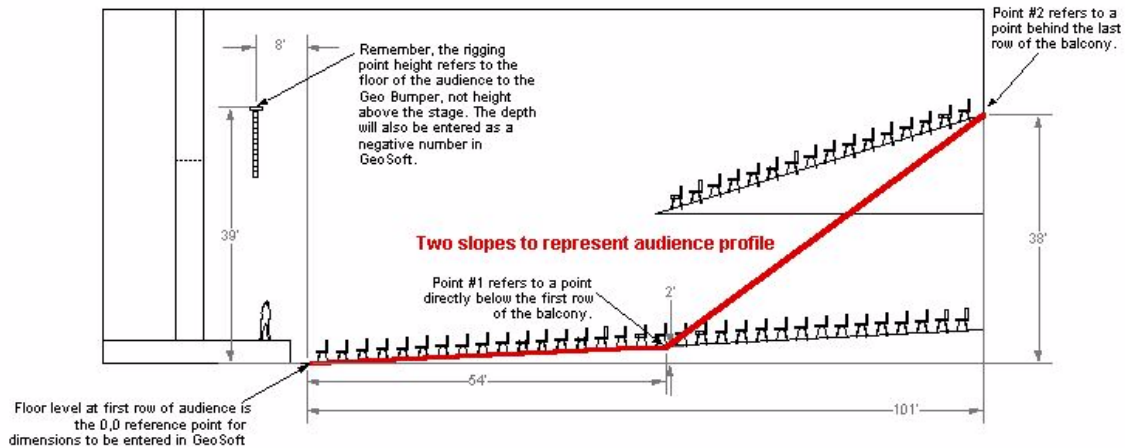
Each Slope Point uses the distance and height information you enter to represent a location along the audience floor relative to your 0, 0 reference point. You can enter negative height values but you should not have decreasing slopes: the software will not process this information properly. Balconies can be represented by a slope from the floor directly below the front of the balcony to the floor just behind your last audience position at the top and back of the balcony.

The following examples should clarify how GEOSoft slopes represent typical audience profiles.

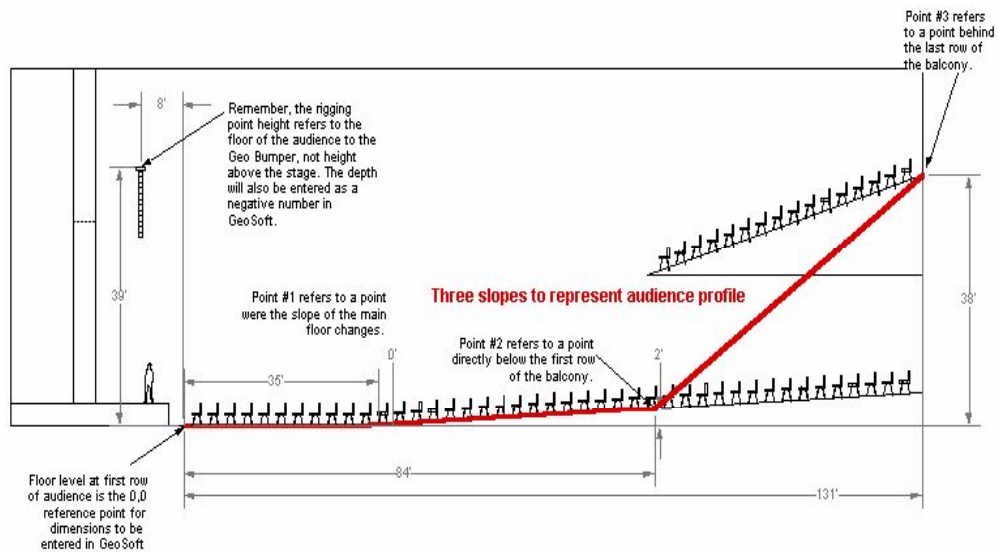
**Define Venue Section Views**



• Figure 1- Single slope room dimension example



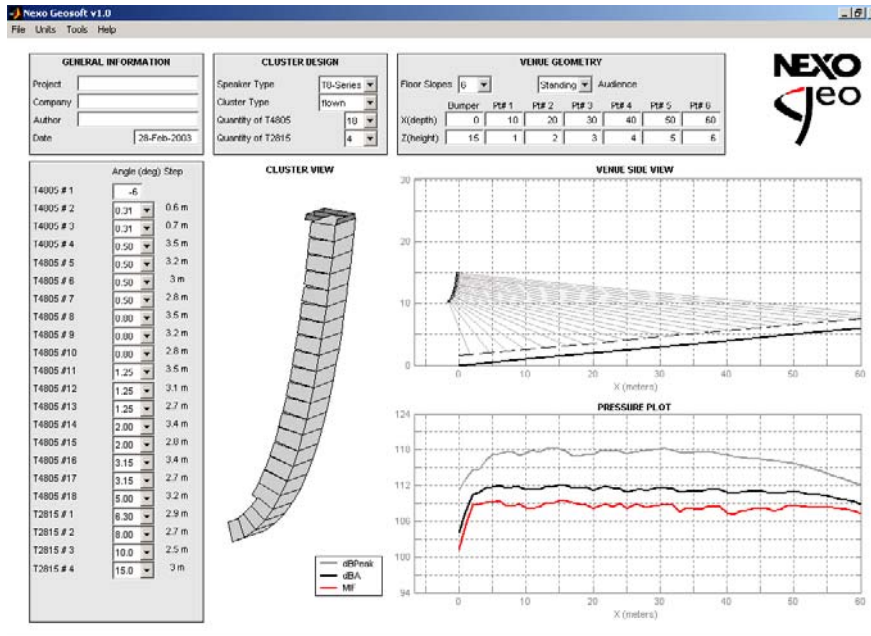
• Figure 2- Two slope room dimension example



• Figure 3 - Three slope room dimension example

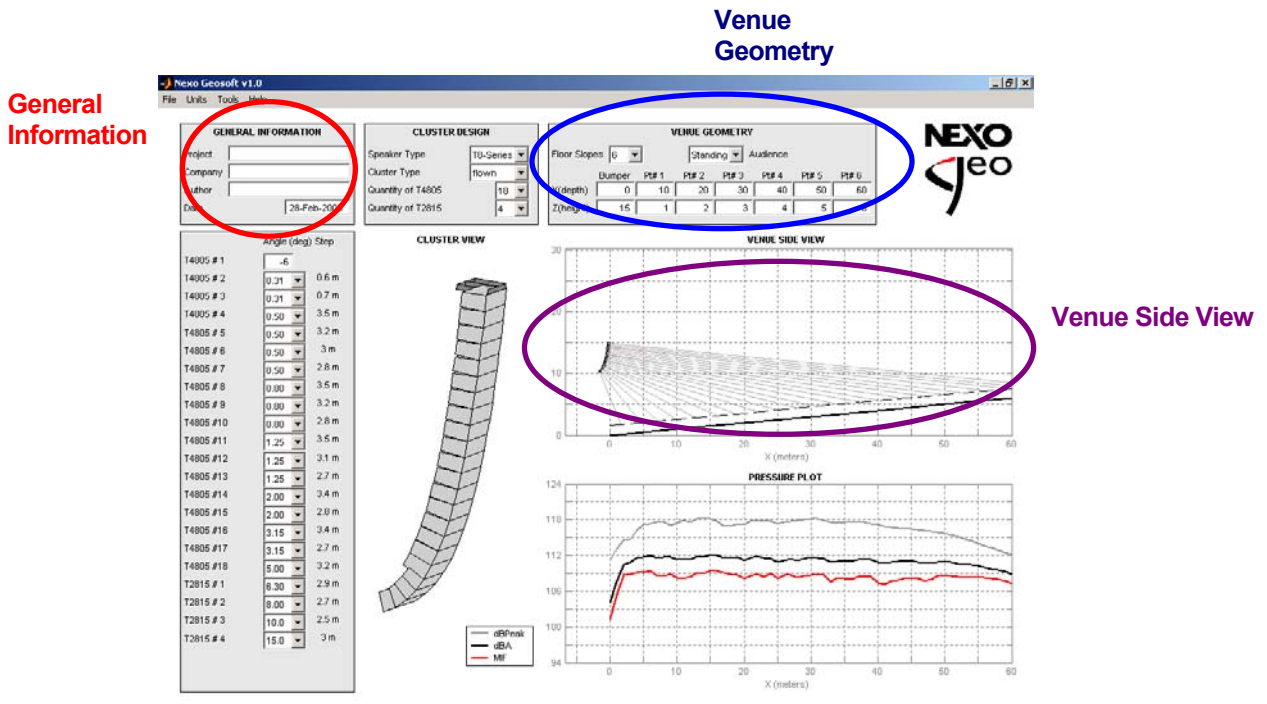
### Use GEOSoft to Plan and Design your GEO Cluster

Open the GEOSoft Software. You should see the application window, and it should look like Figure 4 - GEOSoft Opening Screen.



• Figure 4 - GEOSoft Opening Screen

You can name your project or enter some notes to identify this cluster design in the **General Information** box in the top left corner of the program window. You can also change the dimensional units from the default metric (meters) to English (feet) if you wish. (See Figure 5 - General Info and Venue Geometry updated)

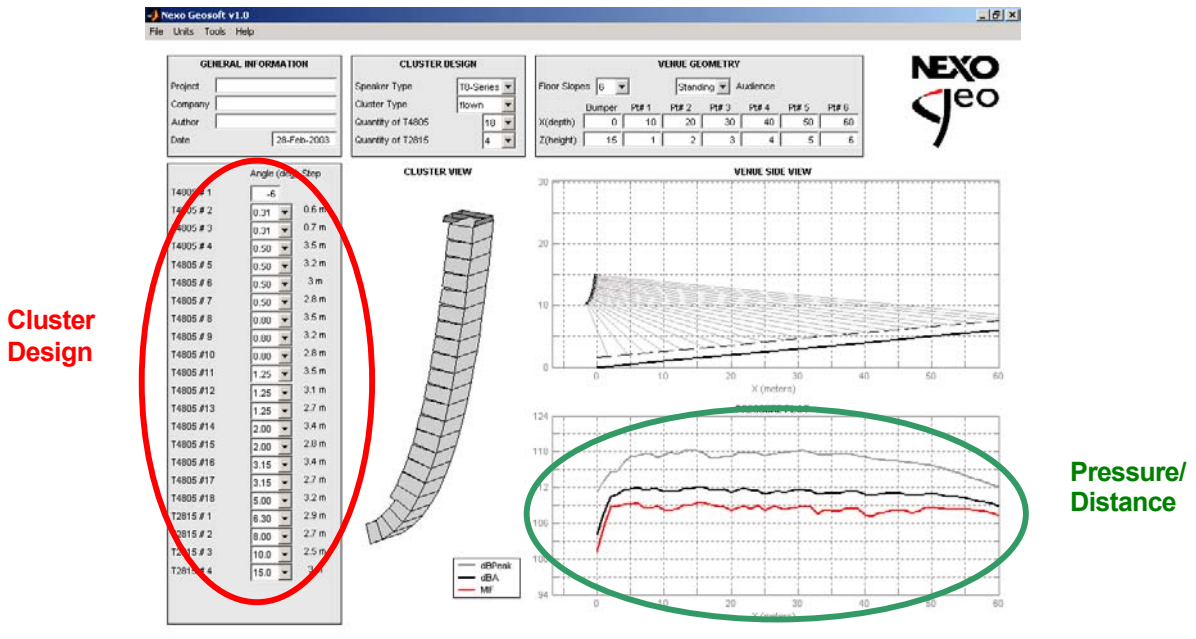


• Figure 5 - General Info and Venue Geometry updated

Enter the number of floor slopes and their distance and height values using the **Venue Geometry** box in the upper right corner of the window. As you enter information, the **Venue Side View** should update its graphic representation of the venue section view. This view represents what you would see if you were to cut the venue along a plane directly in front of the cluster. (See Figure 5 - General Info and Venue Geometry updated)

Enter and adjust data in the **Cluster Design** box on the left side of the screen. Begin by setting the number of S805s / T4805s according to either a) the maximum you have available a quantity appropriate to the venue in which you will be working (see General Application Guidelines). Do not set any S830 / T2815 box until you find that it is impossible to provide even coverage in the front rows without increasing the level beyond what is appropriate for the event.

As you enter and change data, you will see the **Pressure / Distance** plot update. Continue working with your **Cluster Design** data until the **Pressure / Distance** plot displays as flat an HF (red) trace as possible and the dBA trace (black) shows sufficient level for the application. In general, this requires that you have a long enough cluster for the venue and that the angles between adjacent array elements increase from the top to the bottom of the array. You will often find that aiming the top cabinets “past” or “above” the end of the audience area will provide the flattest response in rear: just check your section view to make sure you will not be exciting large reflective surfaces if you deploy this cluster design. For more information on the concept of curved vertical tangent arrays, read *Curved Vertical Tangent Arrays: A Conceptual Model* in this manual. (See Figure 6 - GEO cluster design ready.)



• Figure 6 - GEO cluster design ready

When you are satisfied that your dBA (black) trace is at an adequate level and the HF (red) trace is as flat as you can make it by adjusting the cabinet angles, you should record all the information from the cluster design window. You will need the bumper height and angle data, as well as the splay angles between cabinets when you assemble and hang the GEO cluster.

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