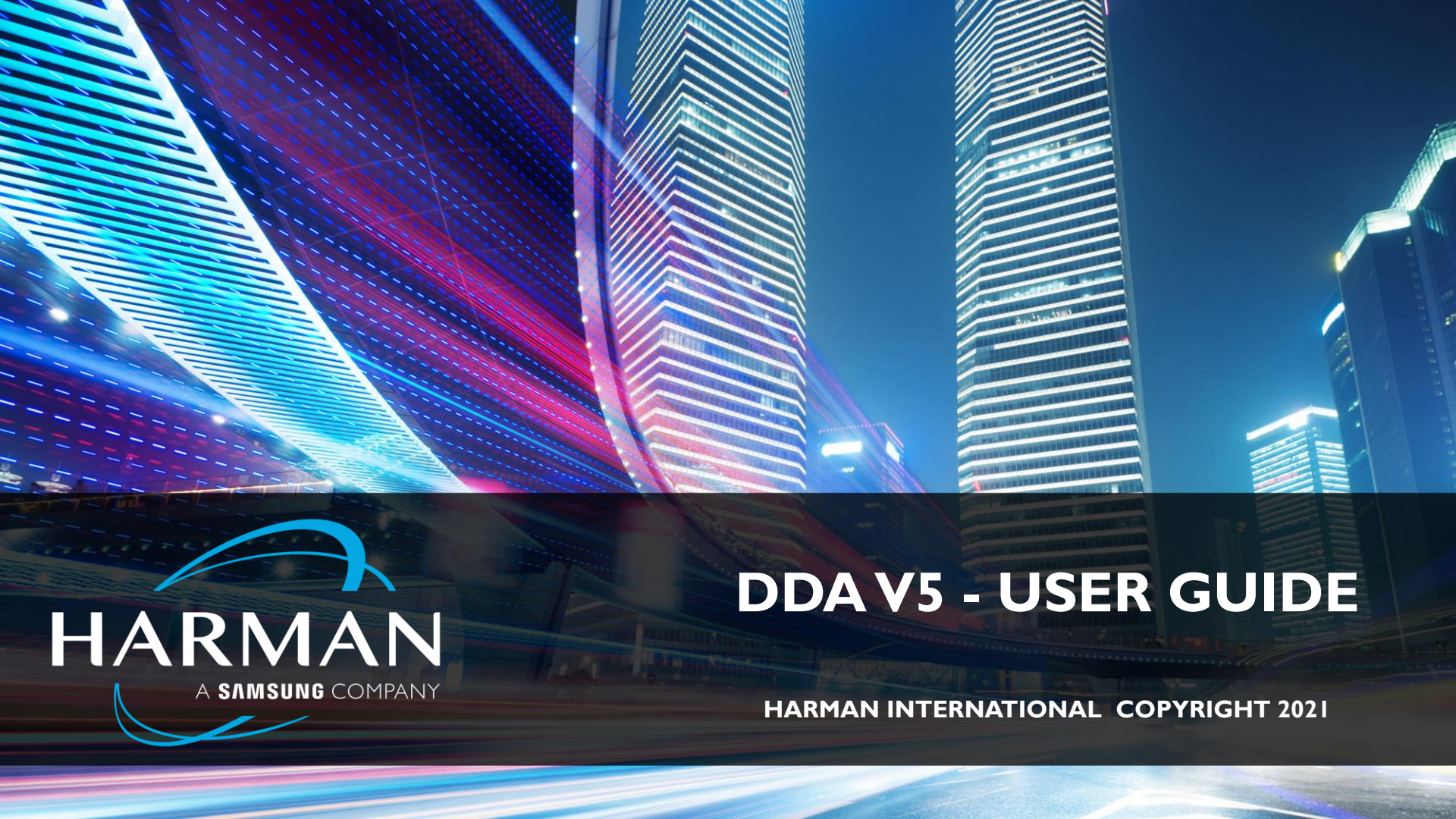
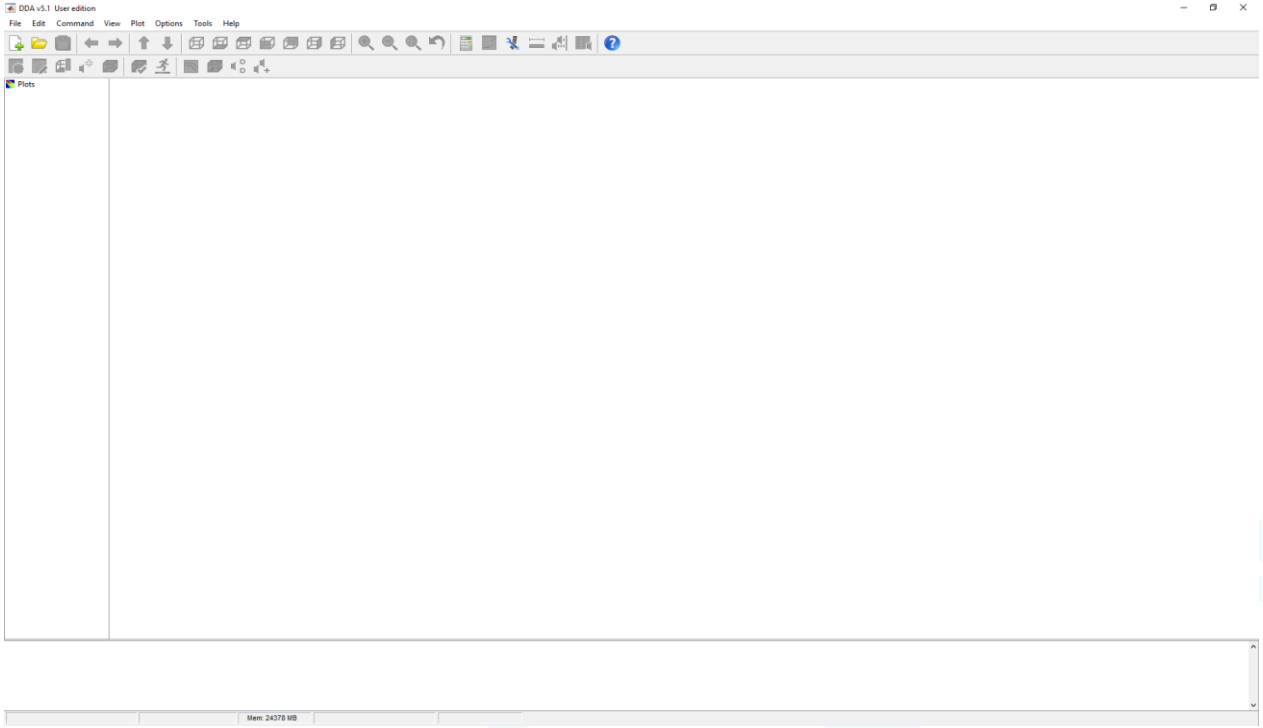
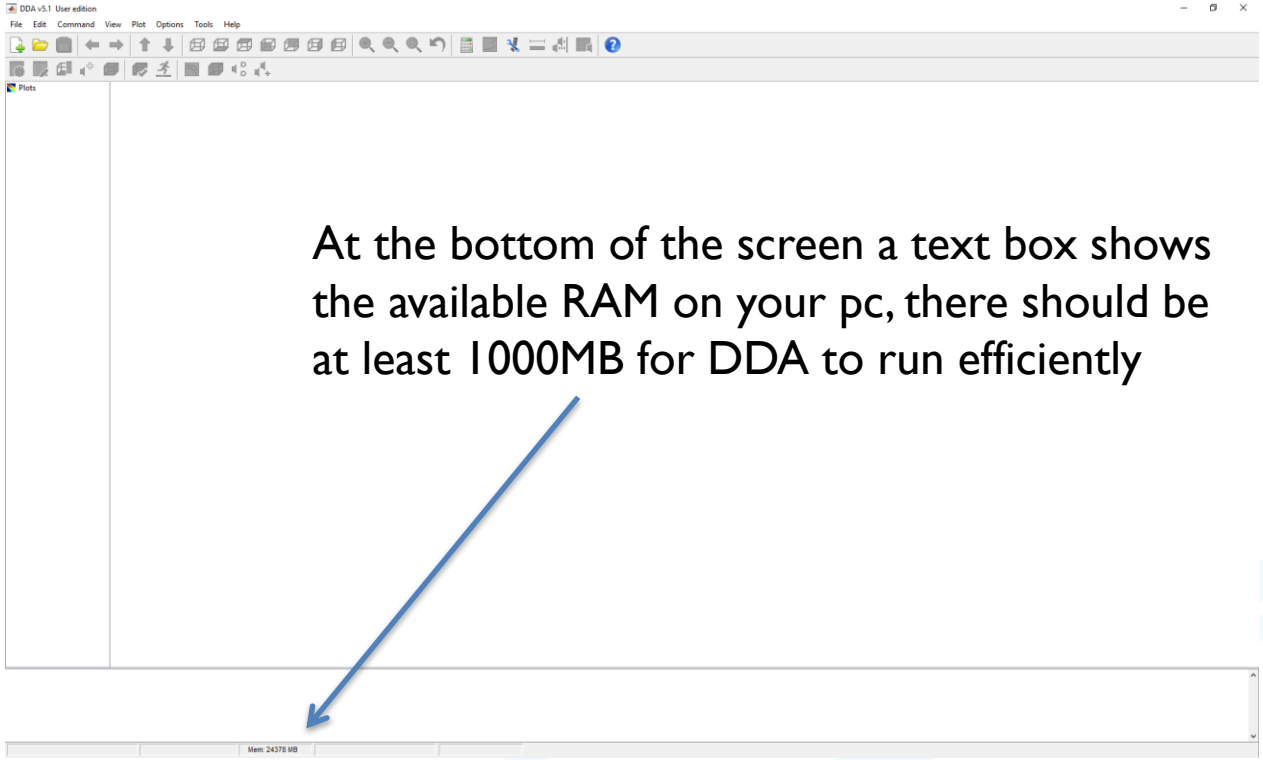


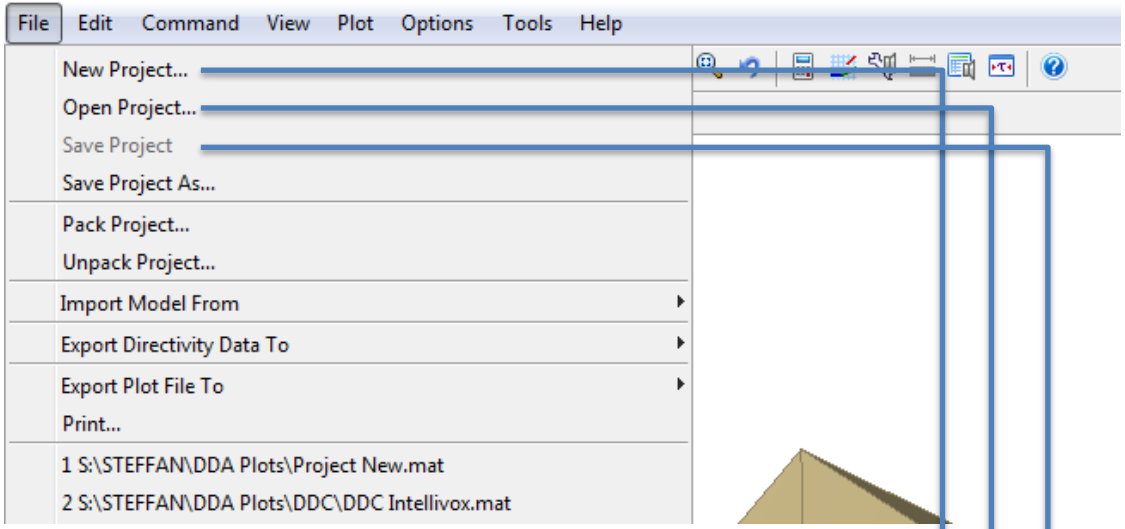

# DDA V5 - USER GUIDE

When you open DDA for the first time you will see a screen like this.

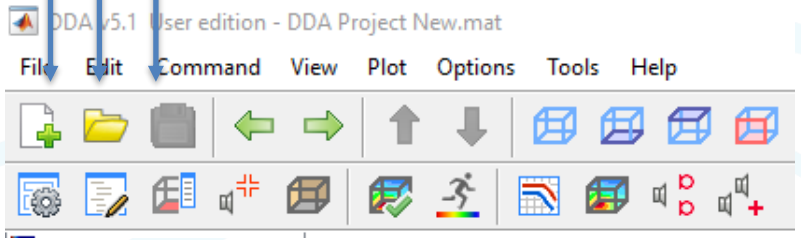


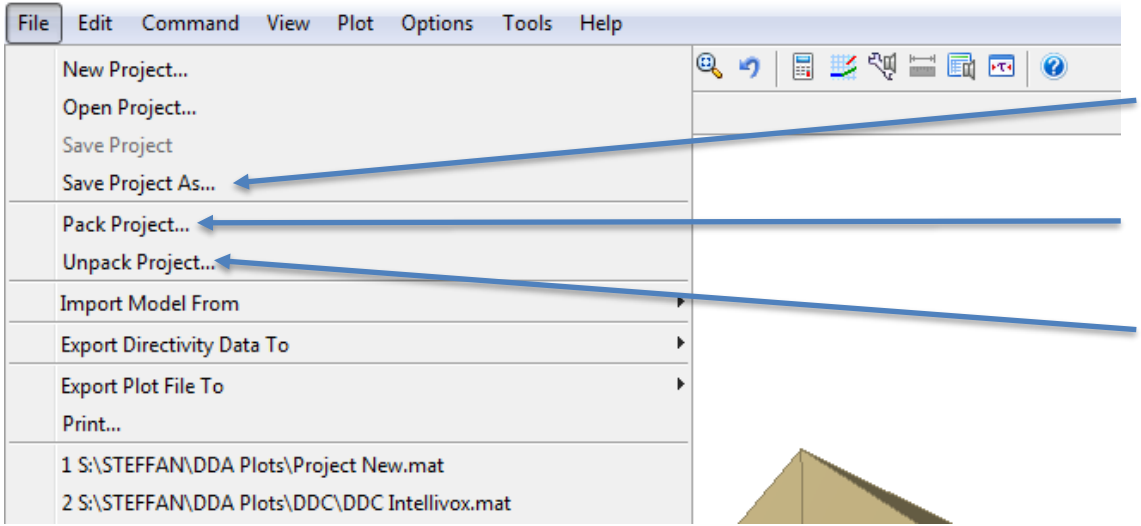



At the bottom of the screen a text box shows the available RAM on your pc, there should be at least 1000MB for DDA to run efficiently




Along the top of the screen are the DDA menu options, some of these functions are replicated in the toolbars.

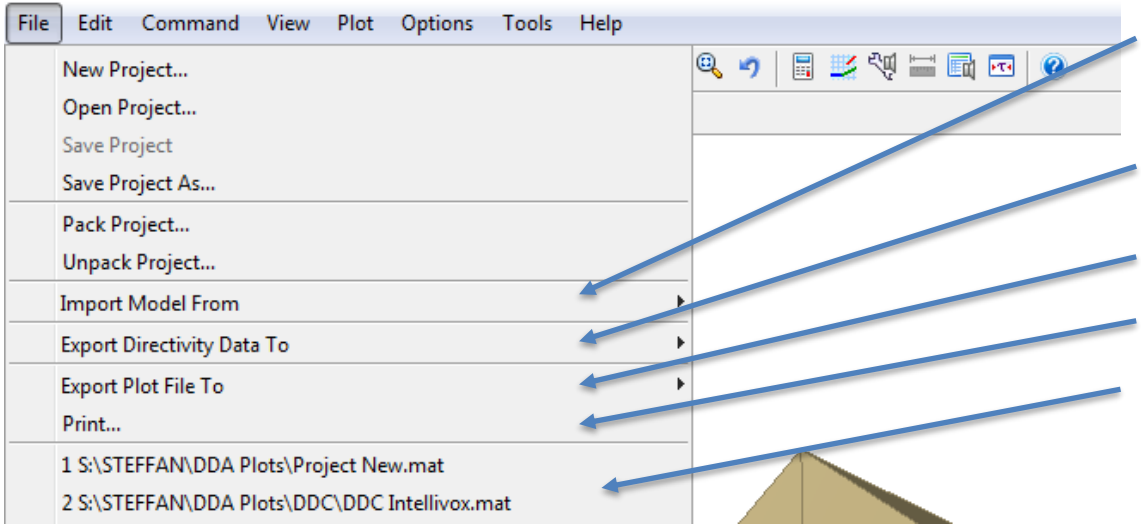





When you make changes to your project such as trying out different speaker types, you can quickly 'Save Project As' change the file name and you can always go back to a previous version.

Pack project – this packs all of the project data you are using into a zip file to enable it to be sent to a client for example.

Unpack Project - unpacks the zip file and DDA will assign all of the project paths automatically to enable you to use the project straight away.




Import a model from Catt Acoustic, Ease or Odeon Acoustic modelling software.

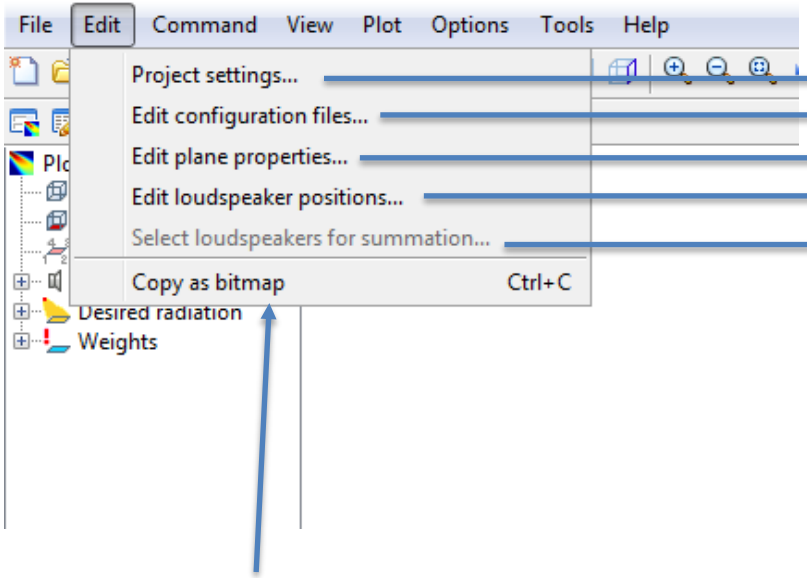
Once you have completed a Full run you can export the directivity files to be used in Catt Acoustic, Ease or Odeon Acoustic modelling software.

Export Jpeg Plot files to be used in a report etc.

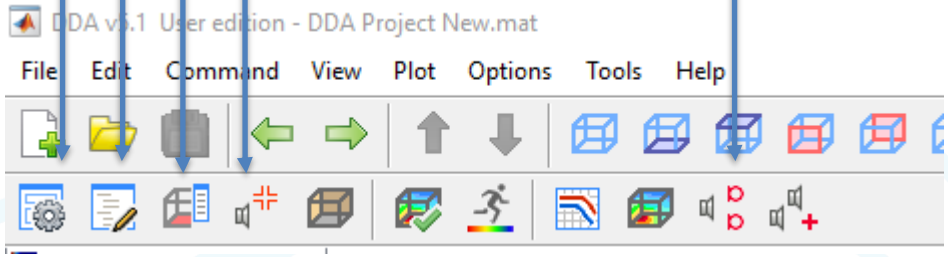
Print Plot files.

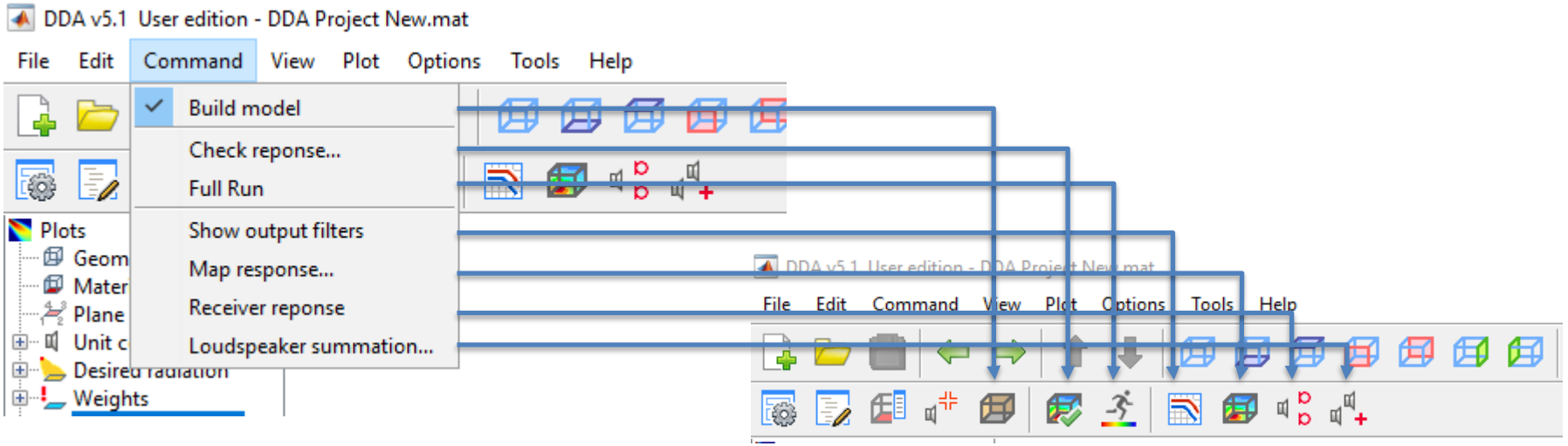
The last 4 projects used will be listed here.

The edit menu, includes the functions which are replicated on the following toolbars.

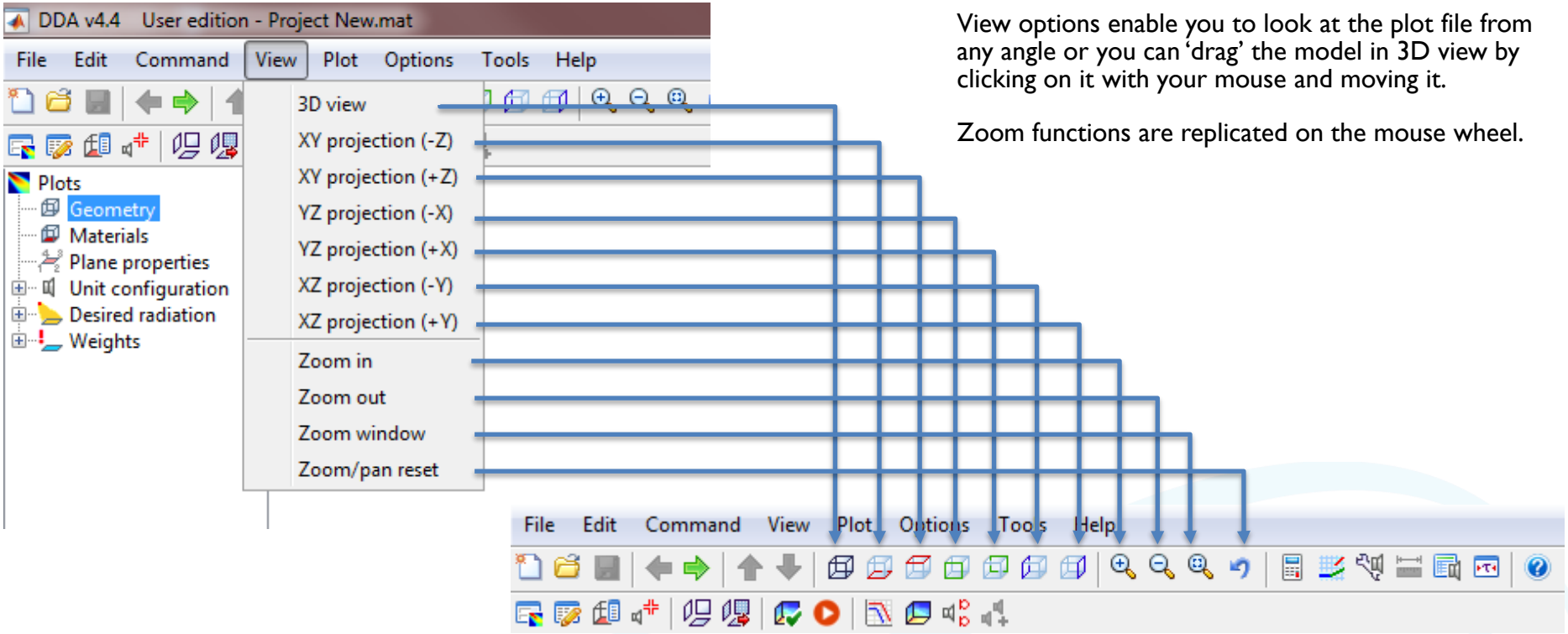



Copies the current plot to your clipboard



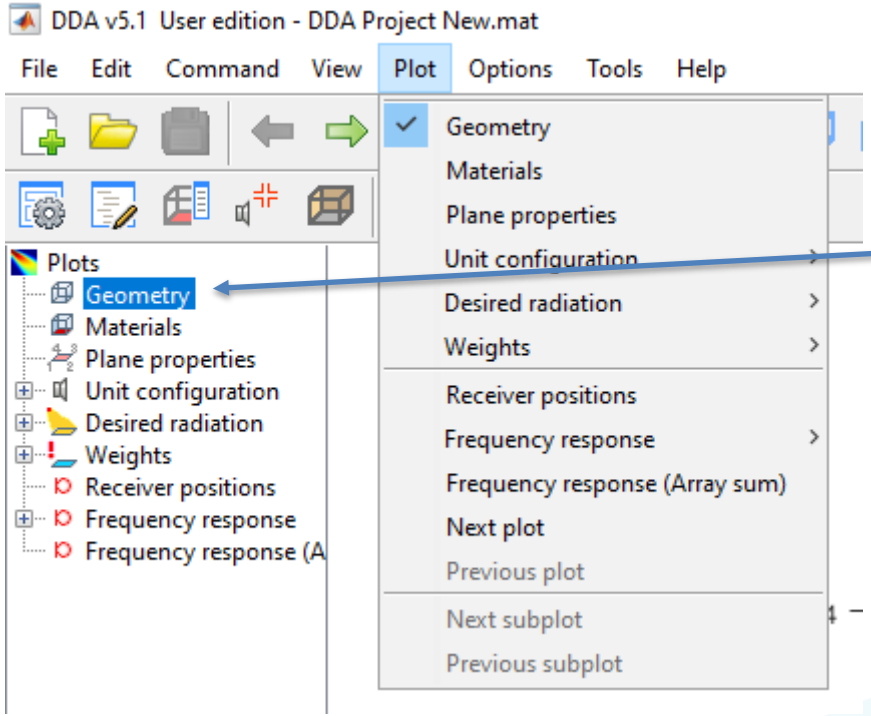



The Command menu functions are assigned as follows

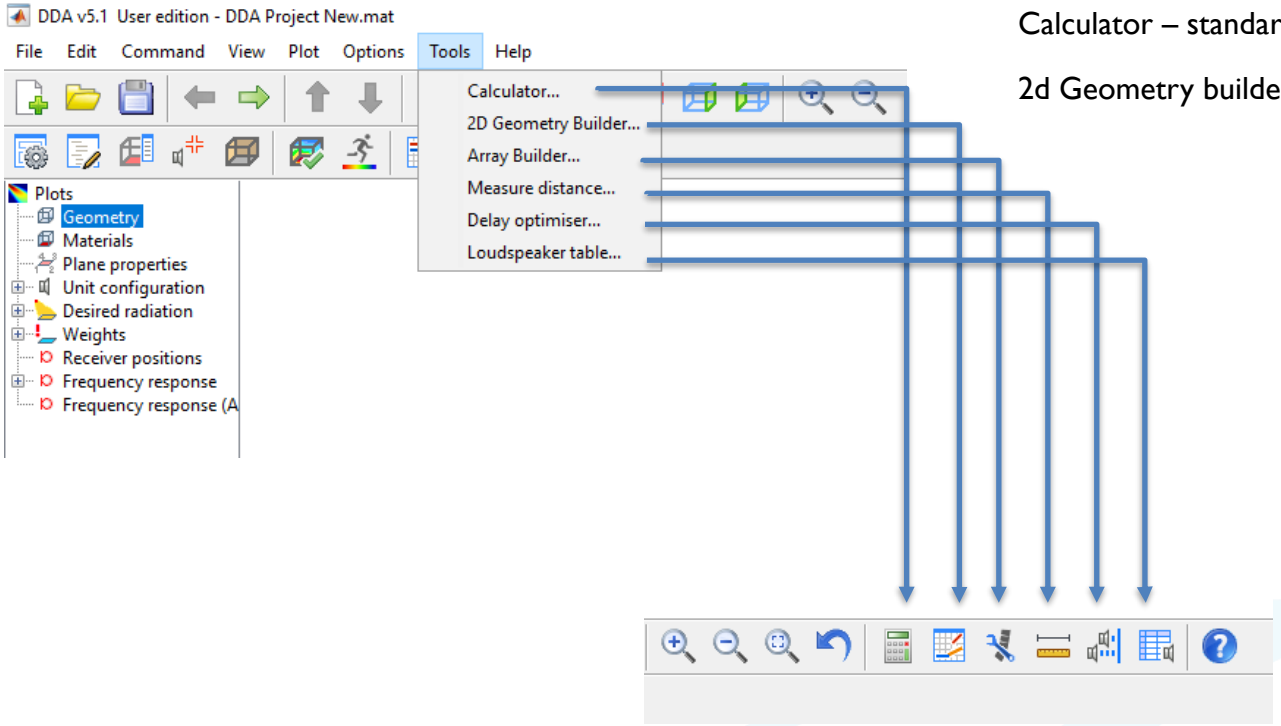



View options enable you to look at the plot file from any angle or you can 'drag' the model in 3D view by clicking on it with your mouse and moving it.

Zoom functions are replicated on the mouse wheel.

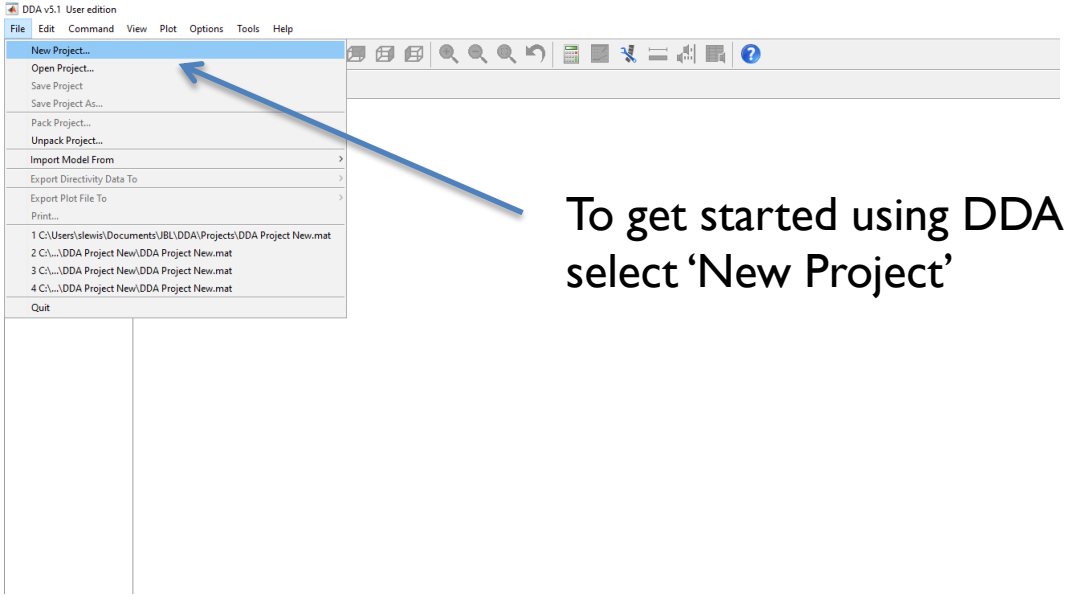



Plot menu options are replicated on the 'tree' in the sidebar of DDA

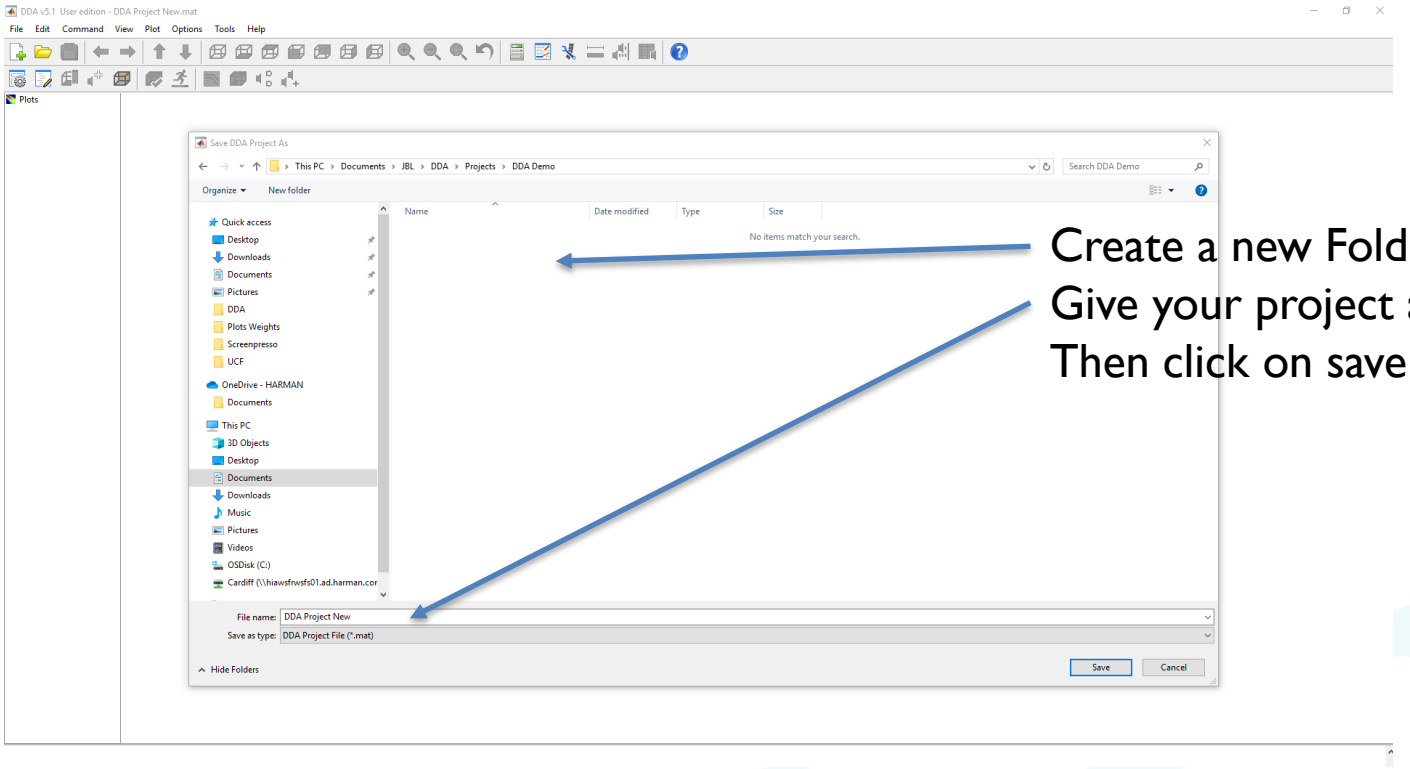



Calculator – standard/ scientific/ programmer/ statistical.

2d Geometry builder as described elsewhere.

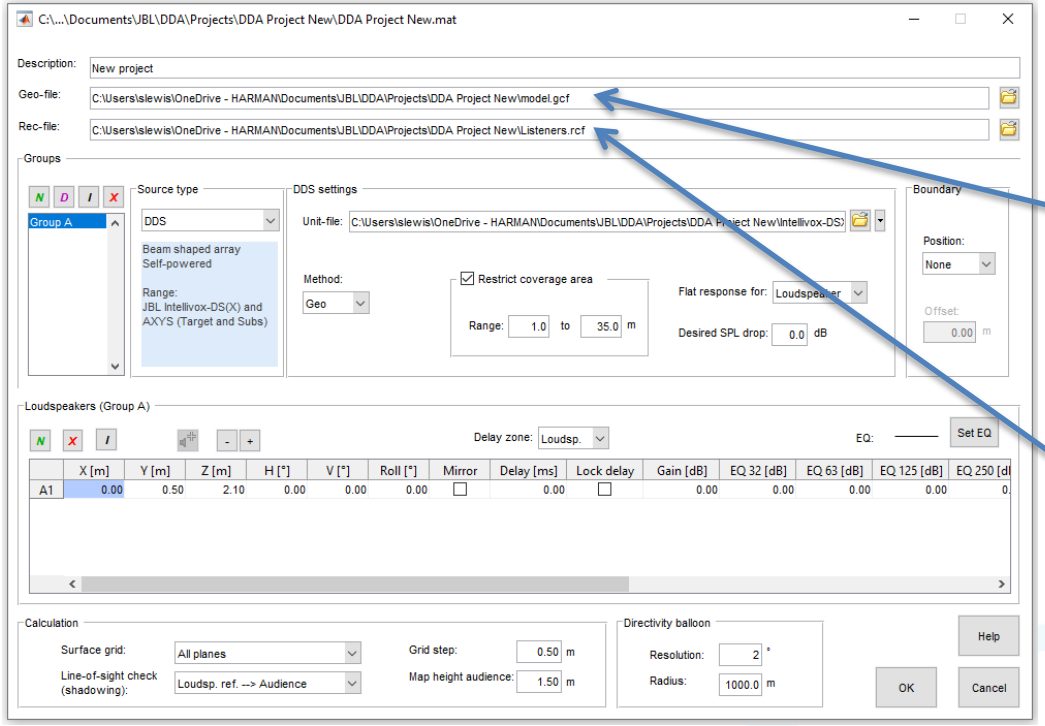



To get started using DDA click on the file menu and select ‘New Project’



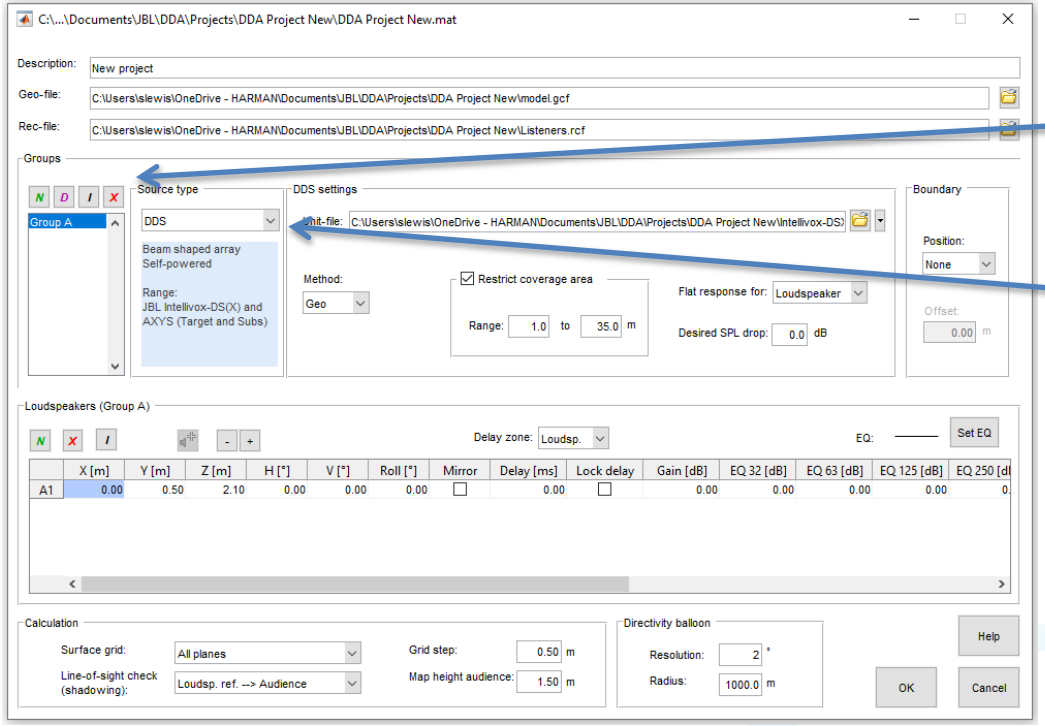

Create a new Folder,
Give your project a name,
Then click on save

# Project settings window will then open




Geo-file (Geometry Configuration File - GCF) this is the geometry or model the DDA project will be based upon - a standard 'shoe box' model is loaded by default.

Rec-file (Receiver Configuration File - RCF) this is the receivers or listeners file where the receiver positions can be placed within the model to indicate receiver response measurements.

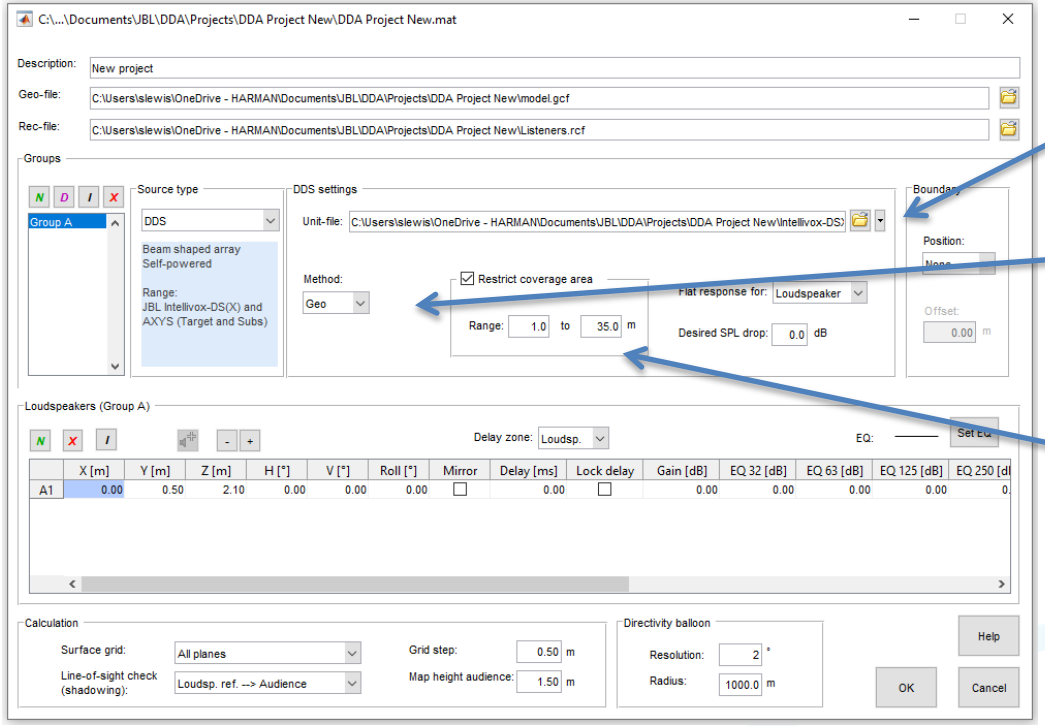



## Each Group consists of a single speaker type

N New group
D Duplicate Group
I Import group (from another DDA project)
X delete Group

Source Type

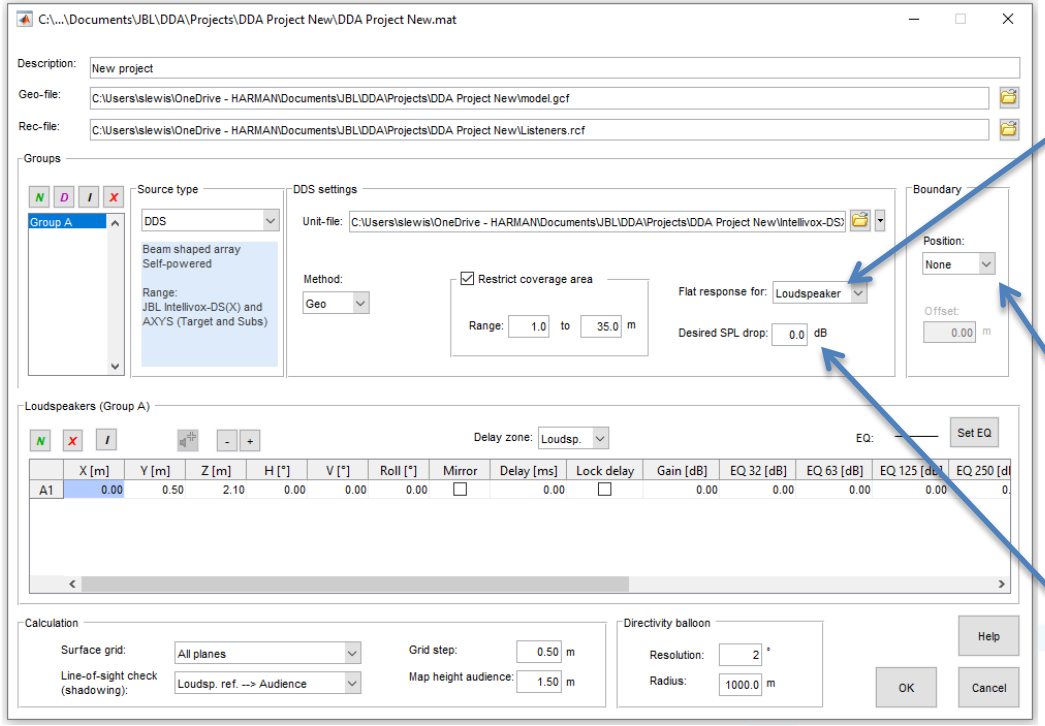
**ADC** – For the passive 100v line V90 and H90
**DDC** – Beam steering Intellivox using Digital Directivity Control technology (discontinued)
**DDS** – Beam Shaping Intellivox using Digital Directivity Synthesis technology
**AXYS** –Full range point source cabinets (discontinued)
**Point Source** – Import any manufacturers' Common Loudspeaker Format (CLF) file




To Change the DDS Speaker type click on the folder here, this will then open the UCF (Unit Configuration File) folder and you can select the various DDS Intellivox.

There are two methods of steering a DDS device, either Geometry or Balloon Method. In almost all cases you will get a more accurate beam by using the Geo method where we define weighting and SPL values to a 3d model.

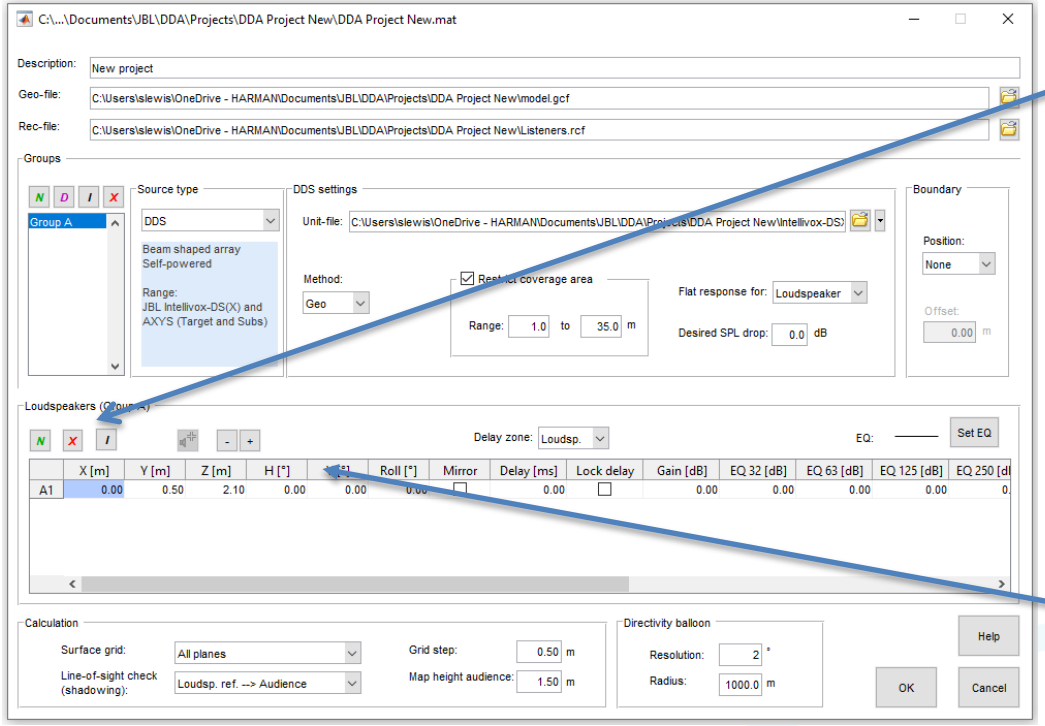
'Restrict coverage area' is defined where we would like the beam to start and end. For example a DSX380 would typically be used to cover a distance of around 35 metres so we would enter a start distance of 1 metre and an end distance of 35 metres. This would then be applied to the planes that we will weight within the model.




Flat response for Loudspeaker or Group, this adjusts the overall SPL for the group of speakers in relation to the desired SPL value. If we had three arrays covering an area and an 85dB requirement then by selecting 'loudspeaker' each individual loudspeaker would try to achieve 85dB which would mean the actual level would be higher or select group then the levels between the speakers would be automatically be adjusted to achieve 85dB.

As DDA works in direct SPL only, we sometimes need to include the reflections from the back of the array e.g. off a brick wall, these can be included here.

Desired SPL drop – a value can be entered to limit the SPL over an audience area so it drops with distance.




## Loudspeaker Section

N - New Loudspeaker

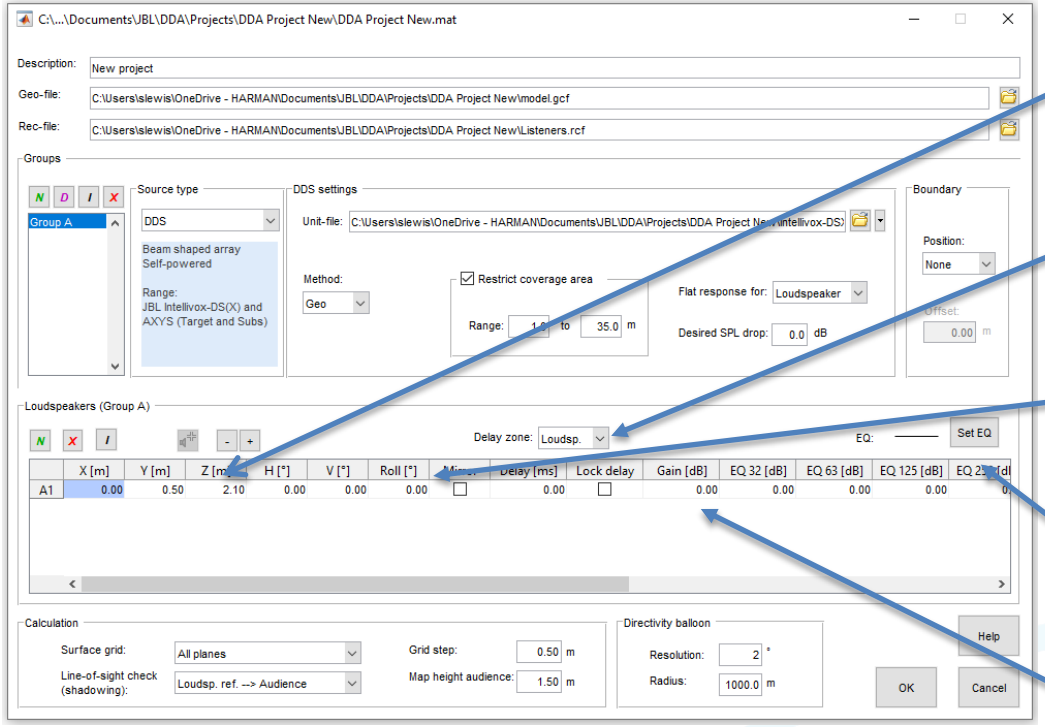
Position the loudspeaker within your model by entering the X,Y,Z co-ordinates

X - Delete Loudspeaker

I - Import Excel Sheet – data imported from columns (1,2,3,4,..) will correspond to the Loudspeaker table Parameters (X,Y,Z,H,...) Twenty one columns and 100 rows of data can be imported. Loudspeaker positions, aiming angles, delays, gain and equalisation values can all be imported or just the XYZ coordinates. Column 21 accepts text for loudspeaker labelling.

Right click on the top of any column to change all values within that column to the value of the selected cell.

E.g. change all Z height values from 2.1m to 2.3m.



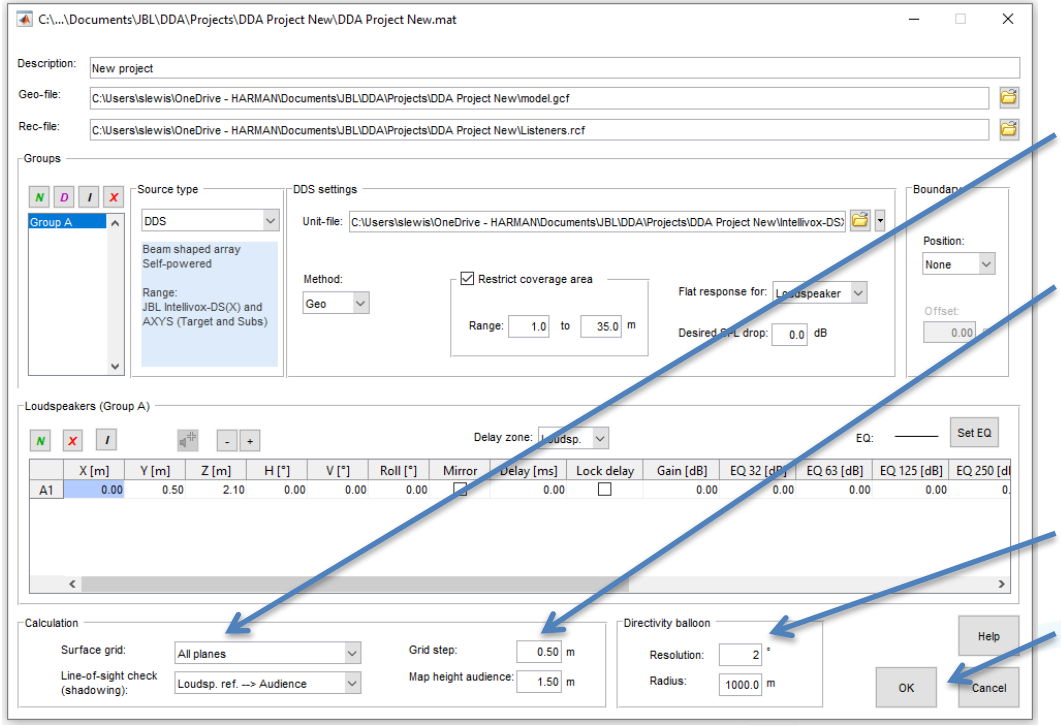

The Z value is defined as the 'acoustic centre' of the array, this should be positioned approximately ≤1m above your audience height.

Delays can be set for each Loudspeaker, either as a group or for each loudspeaker within that group.

H – is the horizontal aiming angle of the array
V – is the vertical aiming angle of the array
Roll – adjust the roll around the acoustic centre of the array

Set EQ – equalisation values can be set here for individual or multiple loudspeakers. E.g. - This could be used to add a high pass filter

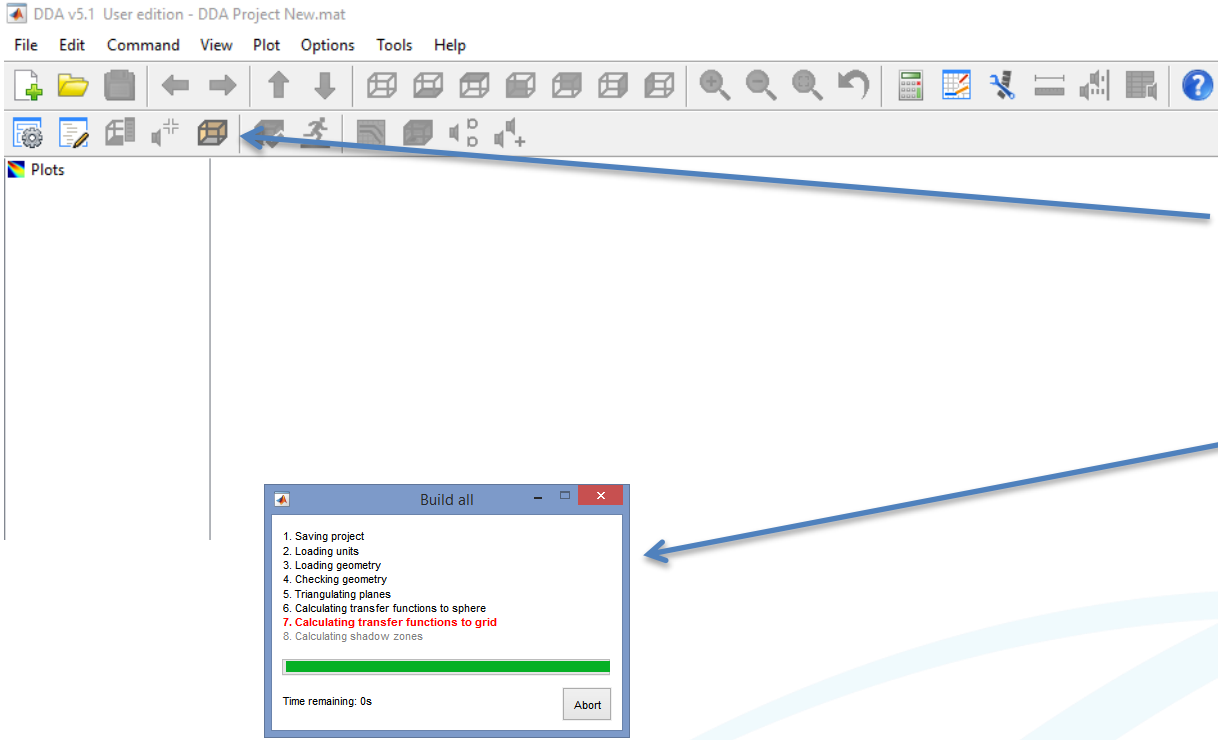
Gain – to reduce the gain of an individual loudspeaker you can enter a negative value. (do not enter positive values for DDS/DDC)




Surface grid - selects planes to be plotted on for visual reference
Line of sight check – give you various options for displaying shadowing from structures such as pillars within your model

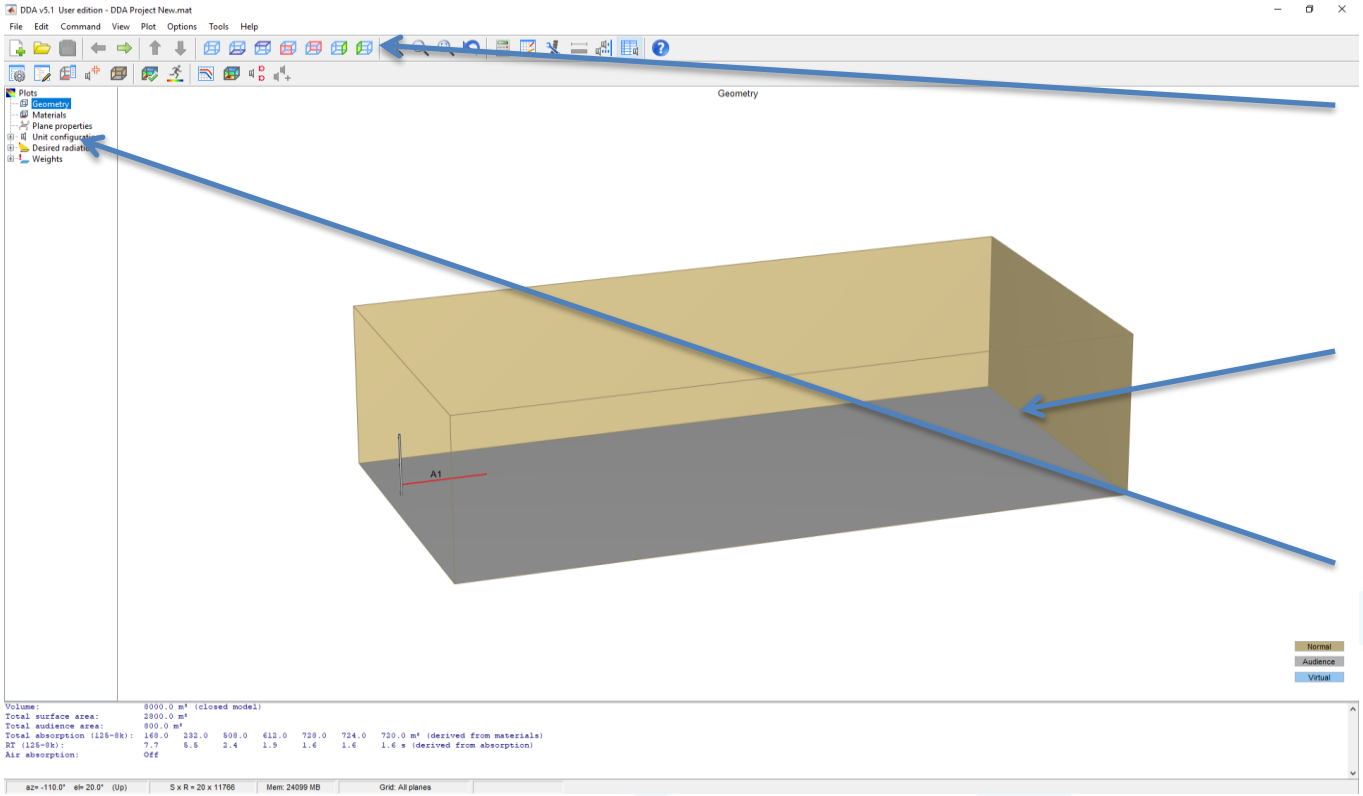
Grid step - changes the resolution of your model, for a small room such as a boardroom you may want to use a smaller grid step such as 0.25m, whereas a large train station you may want to use a larger grid step such as 3m to speed up calculation times.

Directivity balloon resolution can be adjusted here (for visual reference only)
Once your changes have been made to the project settings click on OK and then the model will need to be 'built'



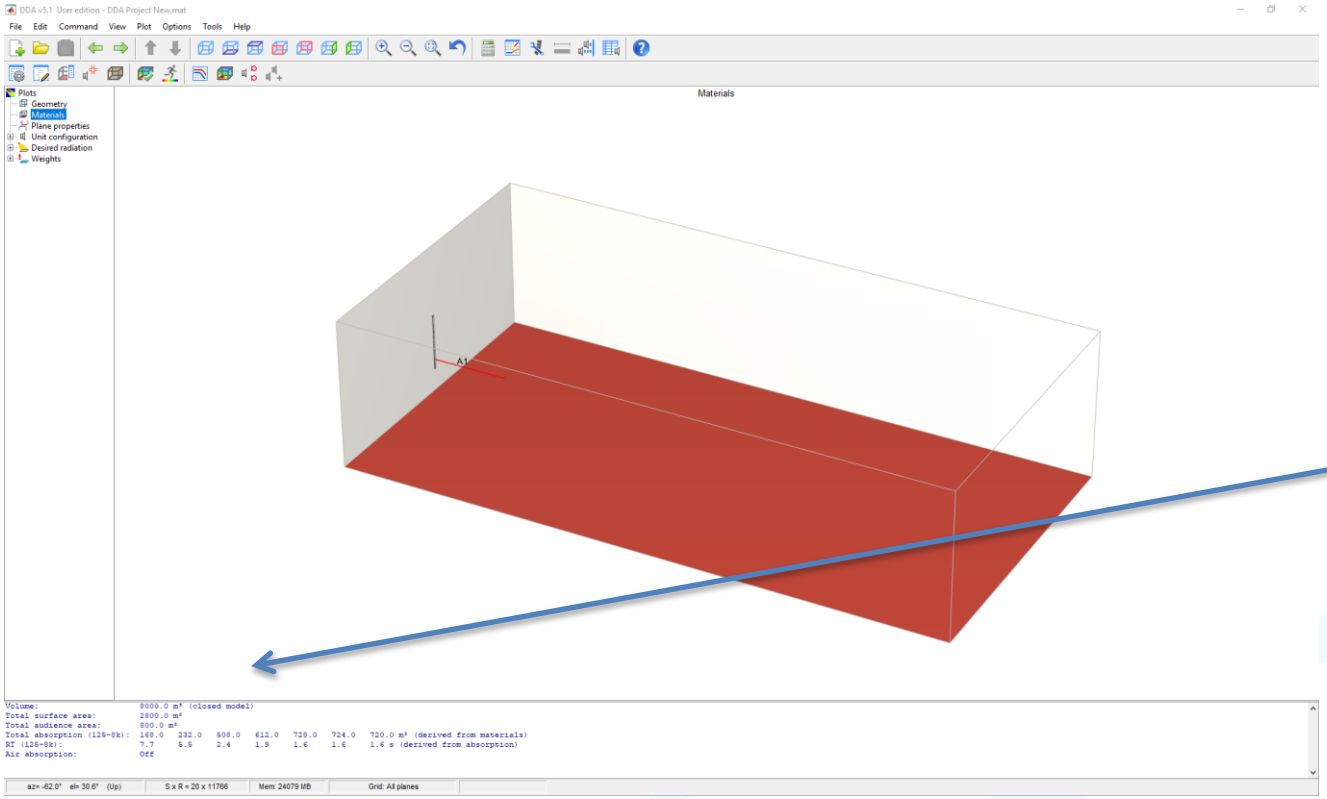

Click on Build Model to start working with your model

A 'Build All' box will open to show the Calculation progress



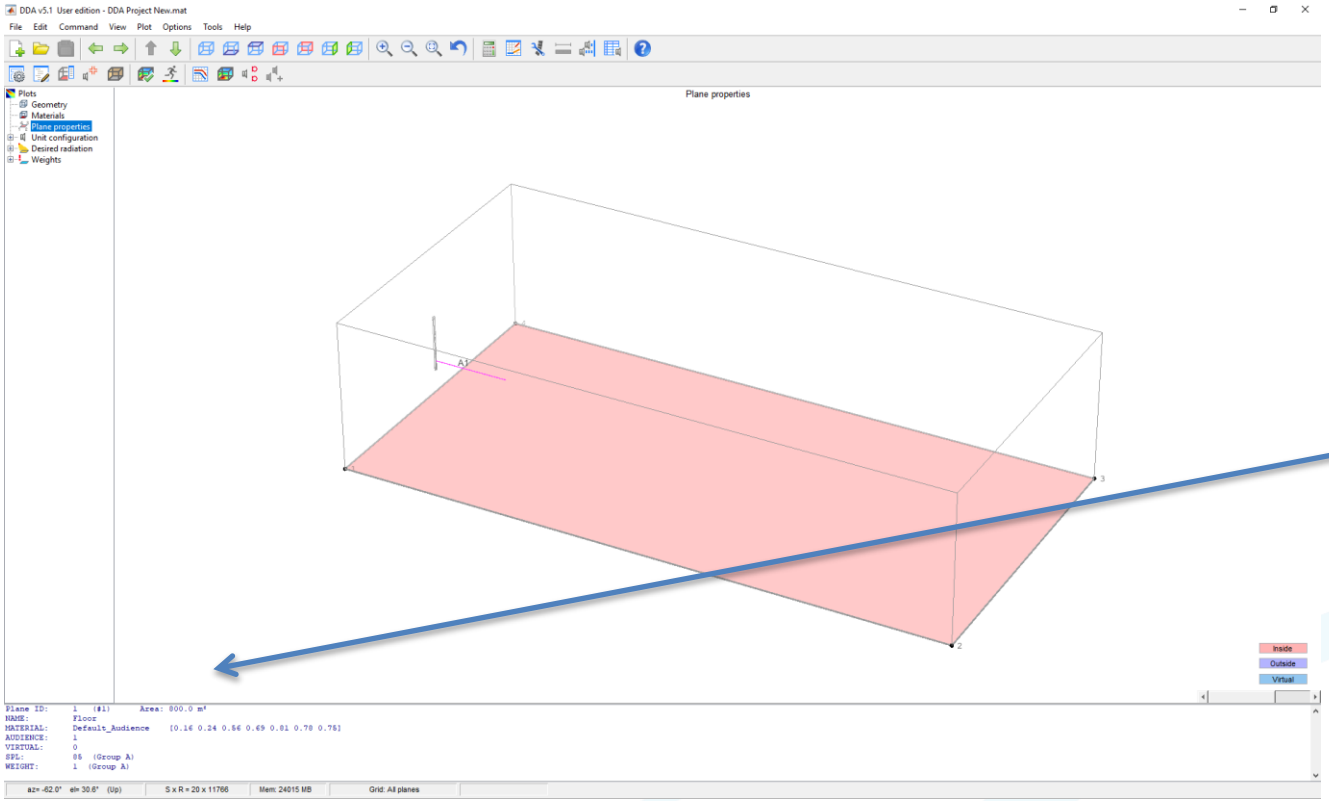

You can drag the model in 3d mode or look at the plan and section views by clicking on the toolbar.
Use the mouse wheel to zoom in and out, click on the mouse wheel to drag the model.
The default box model is built with the walls and ceiling coloured brown and the audience plane shown in grey.

The tree on the left hand side shows –
- Geometry view, (as shown)
- Materials
- Plane properties
- Unit Configuration
- Desired Radiation
- Weights




Materials view shows the surface materials used.

There is an option in ‘edit plane properties’ mode to change the absorption coefficients of the planes, the model should be ‘closed’ for this to work correctly and this is indicated at the bottom of the screen.

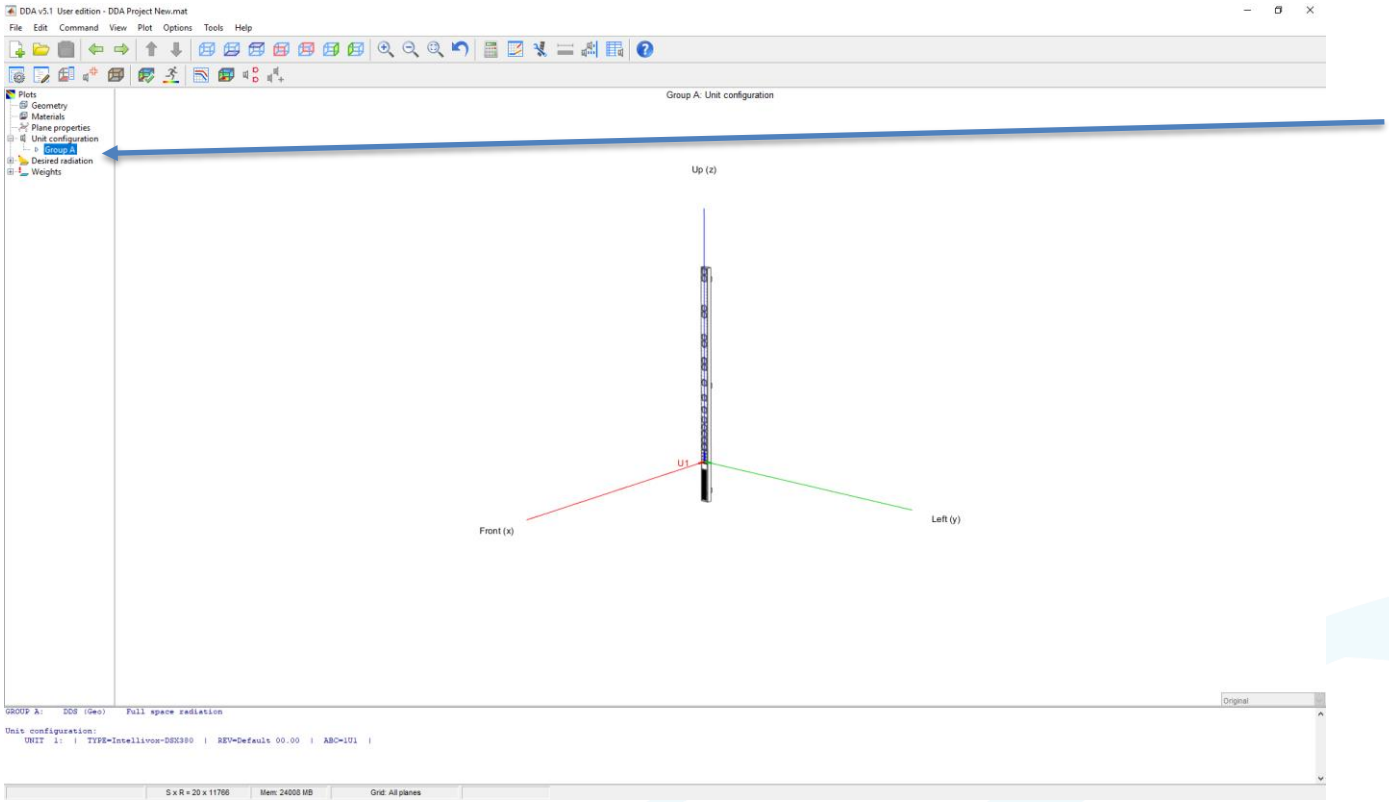



Plane properties mode allows you to identify surface planes by clicking on them with your mouse.

Pink colour shows the surface plane is orientated correctly and is facing into the model.

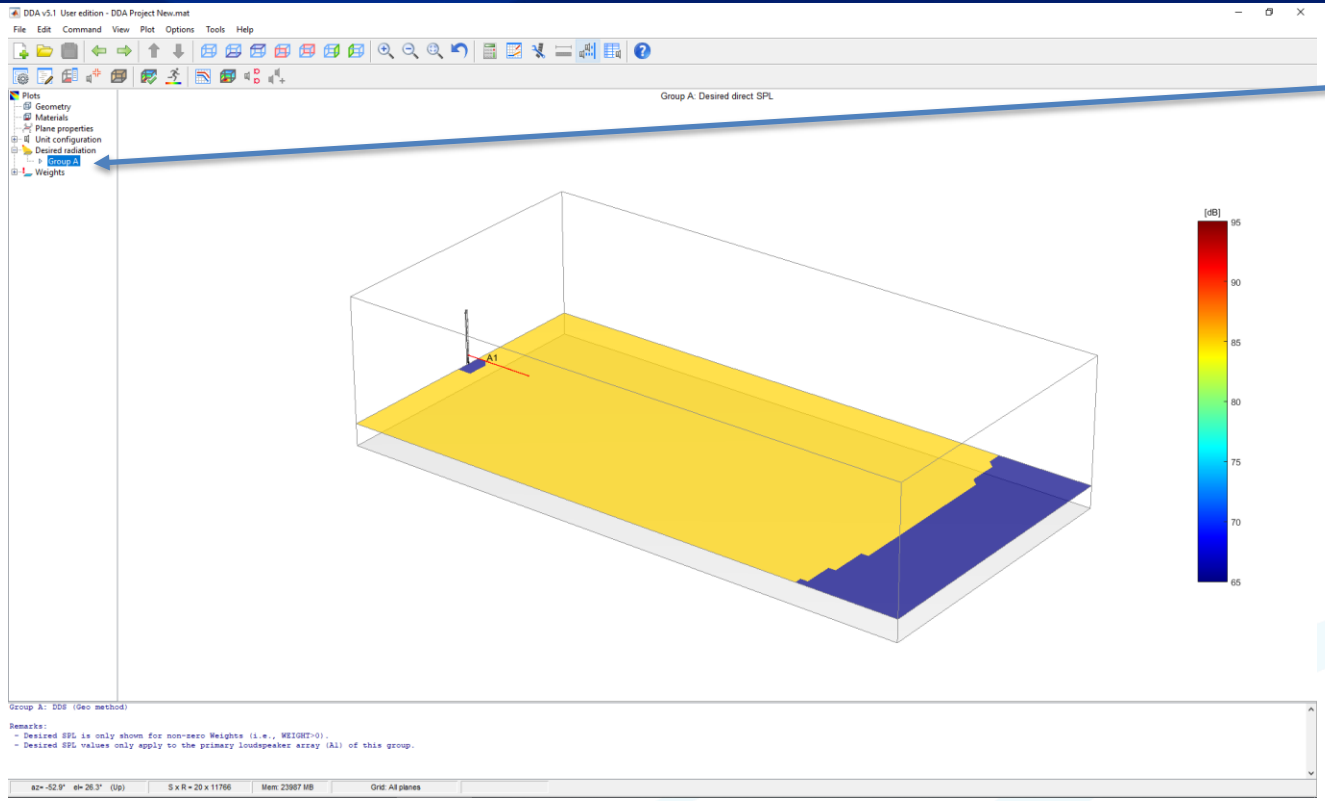
Blue colour indicates the back of a plane surface.

As you click on the planes they are identified and the surface information is displayed.




Unit configuration displays the loudspeaker units used within your model

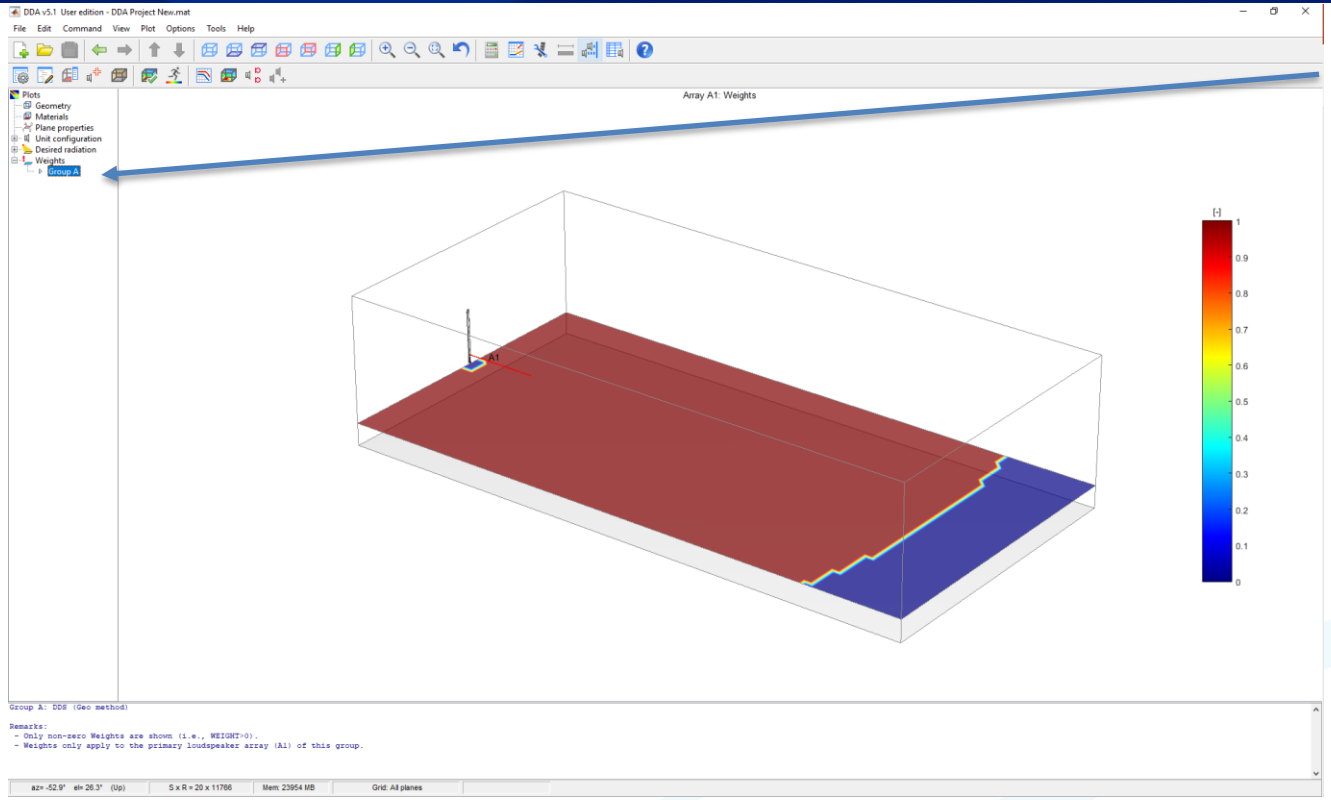
Again you can zoom in and out and drag the speaker round to look at different view points or look at plan and section views.




Desired Radiation

– for DDS speakers only -

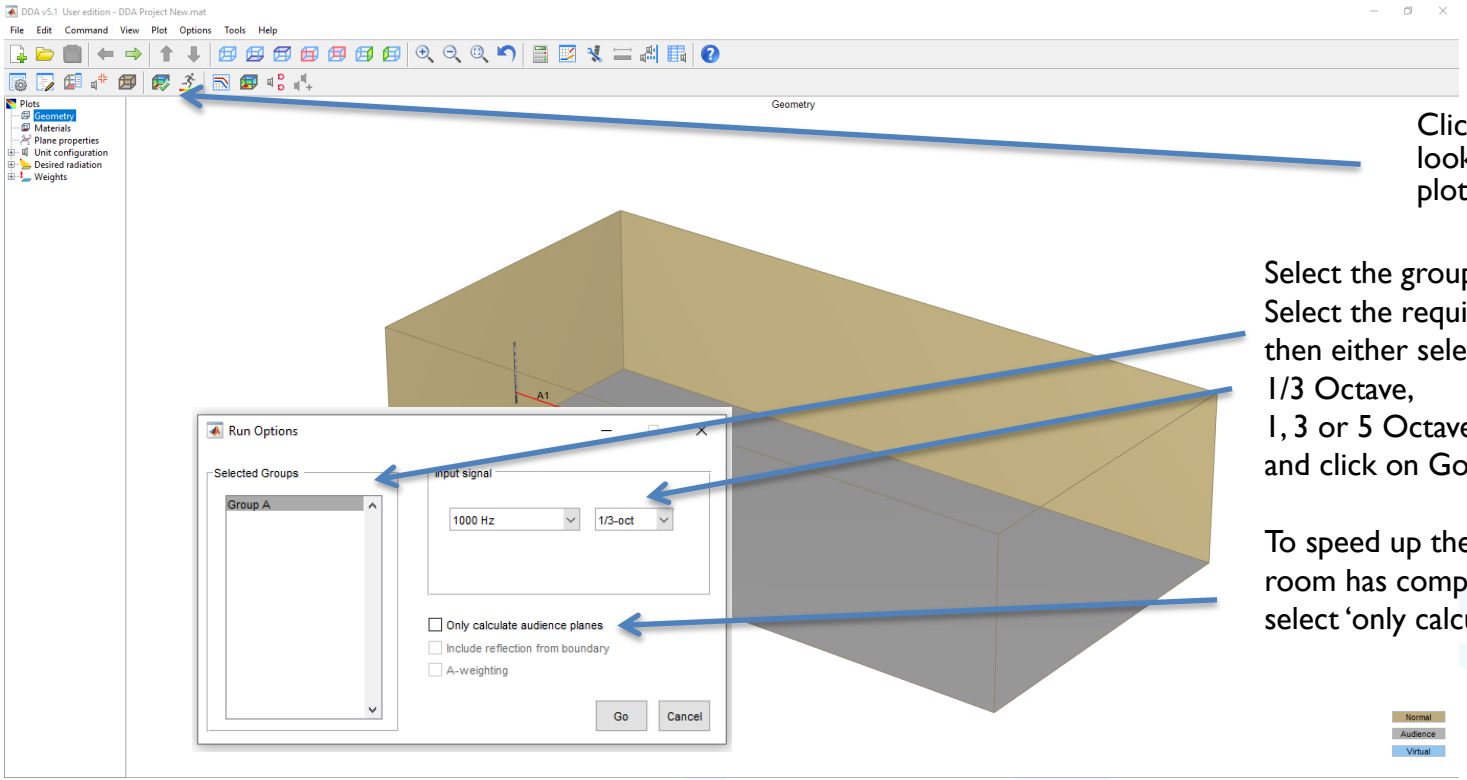
shows the target SPL you would like to achieve over the audience area.




Weights – for DDS speakers only -

This shows the weighting or importance factor of achieving your target SPL over the audience area. In the default model the audience plane is weighted with a target of 1. As this is the highest 'weight' within this model and no other planes are weighted this will give an optimum coverage over the audience area.

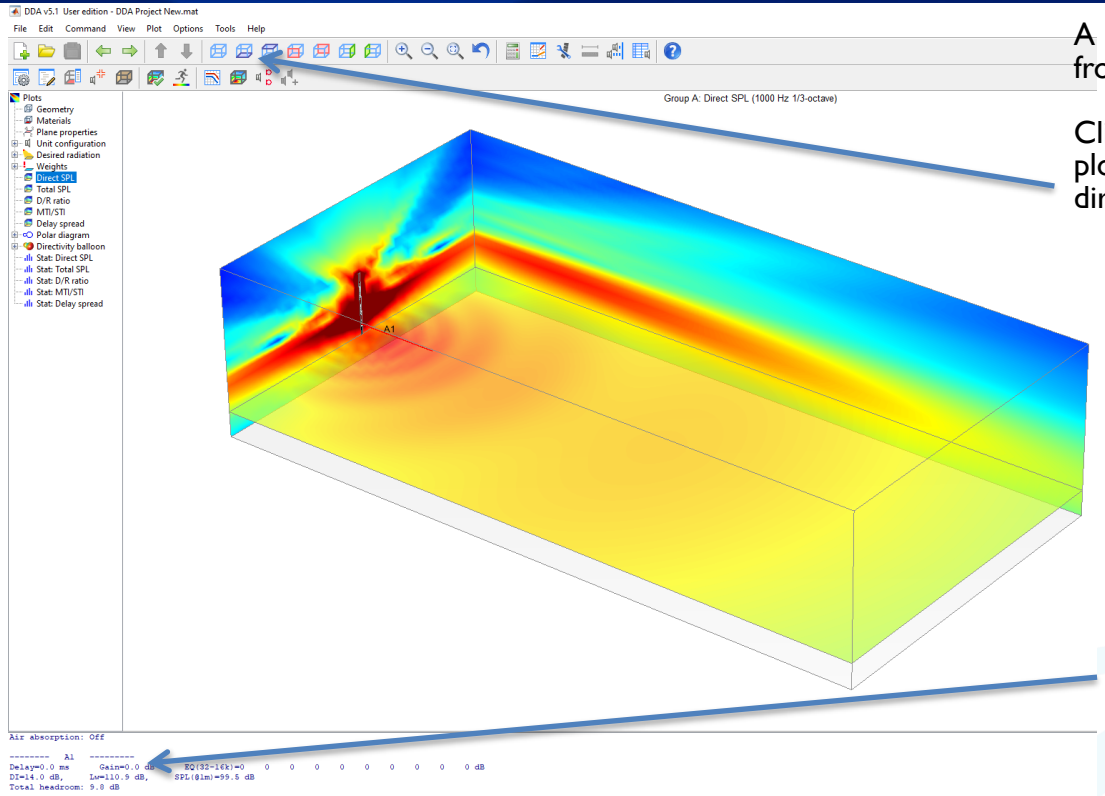
If for example we had an end wall reflection we could weight the end wall plane with a weight of 2 and as this is a higher number than the floor it would be seen as more important to avoid the end wall than cover the end of the audience plane so the DDS algorithm would steer the beam down to avoid the end wall.




Click on 'Check Response' to look at direct SPL response plots from your system

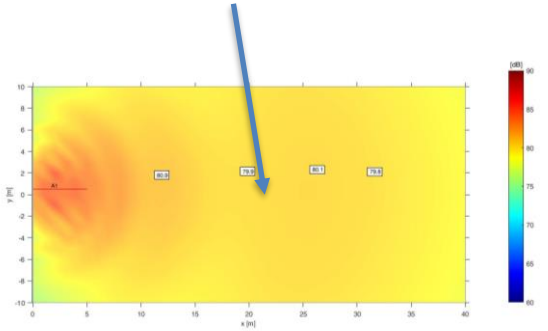
Select the group of loudspeakers,
Select the required input frequency
then either select sine,
1/3 Octave,
1, 3 or 5 Octaves
and click on Go.

To speed up the calculation or if your room has complex geometry you can select 'only calculate audience planes'.

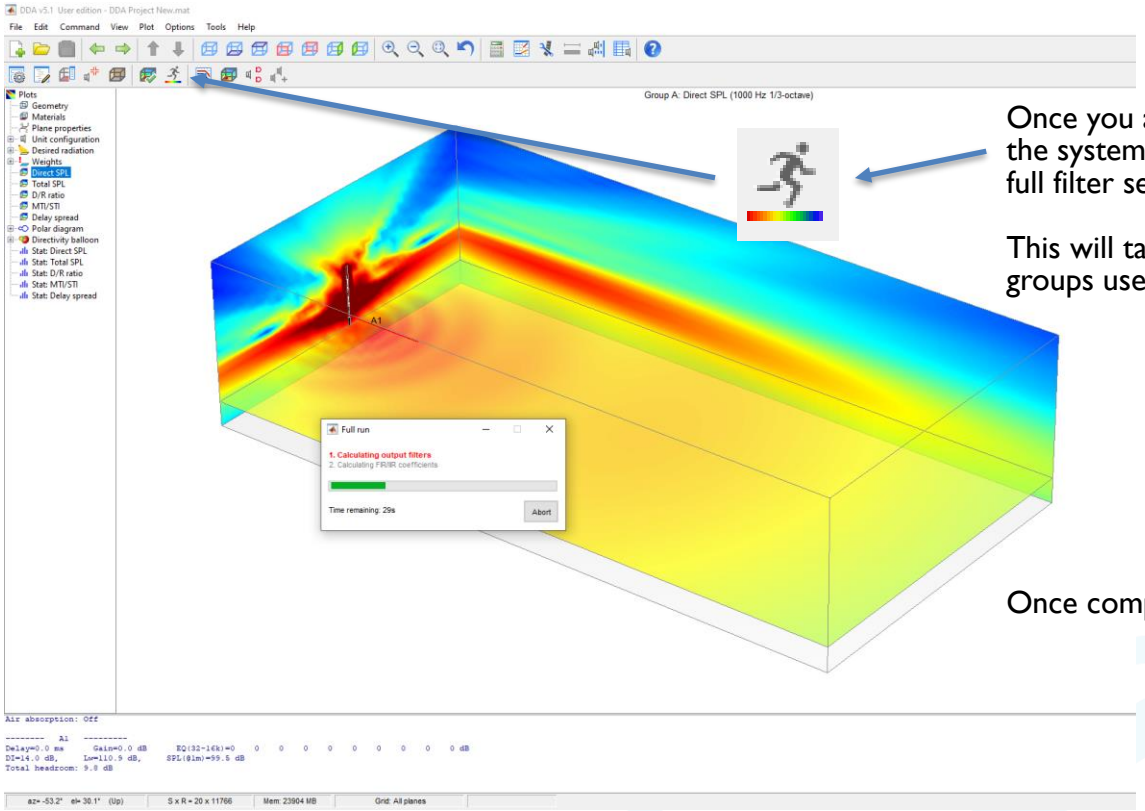



A plot will then be displayed showing the direct SPL from the system.

Click on 'xy projection' to look at a plan view of the plot, then by clicking on the screen with your mouse direct SPL measurements will be displayed on screen.

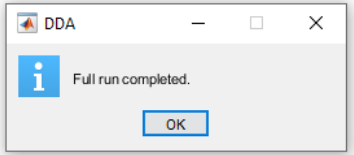


Amplifier headroom of the system is displayed in the lower text box, if this figure is negative then your SPL requirements should be checked and revised accordingly (if using a full range spectrum Pink/Male etc).

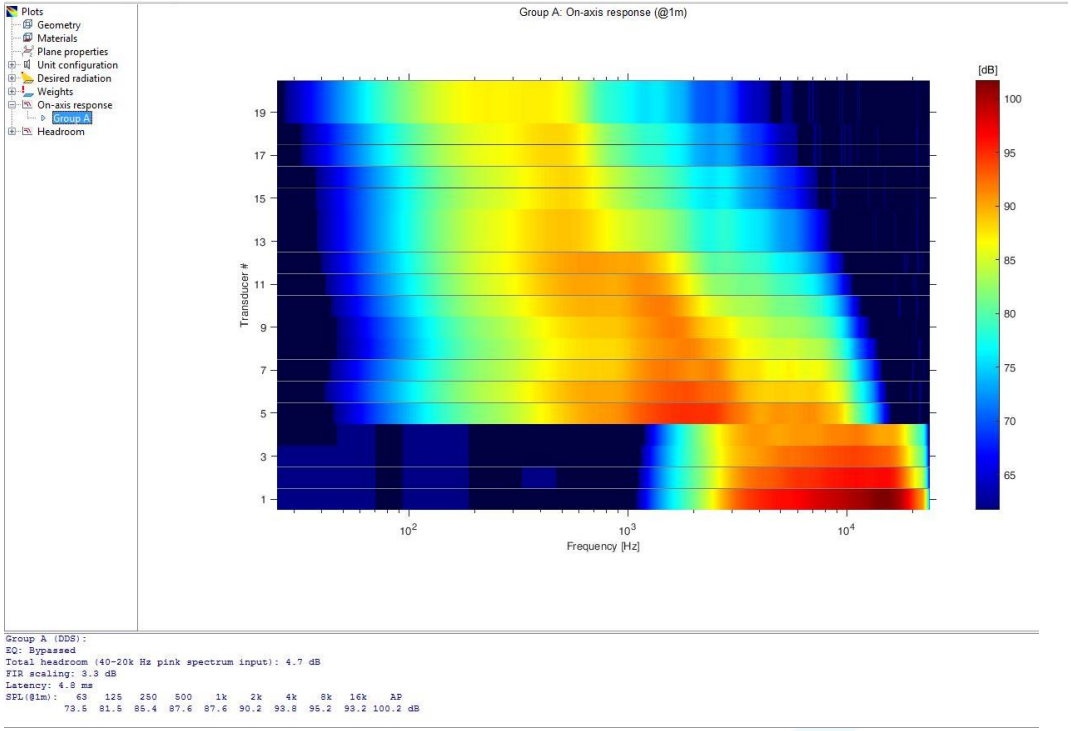



Once you are happy with the direct SPL distribution from the system you can click on 'Full Run' this will calculate the full filter settings for the array and output the beam file.

This will take a few minutes depending on the quantity of groups used within your DDA project.

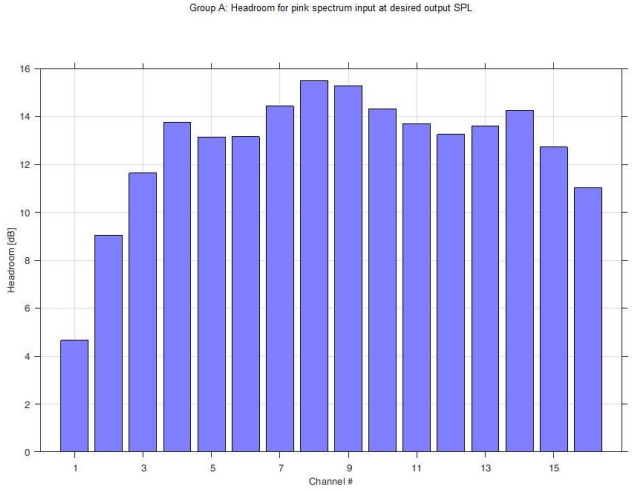


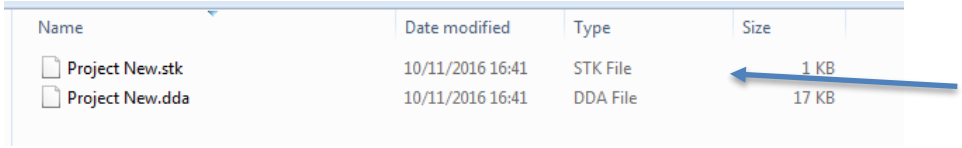

Once complete a warning box will be displayed.




Once the full run is complete it displays the frequency range that each transducer is reproducing.

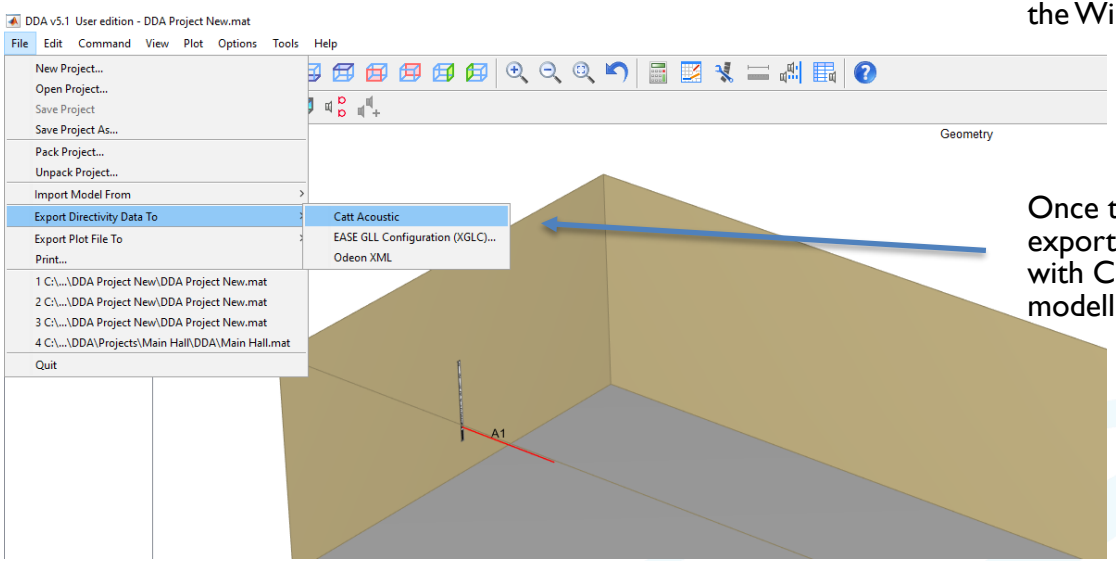
There is also a graph to indicate amplifier headroom.



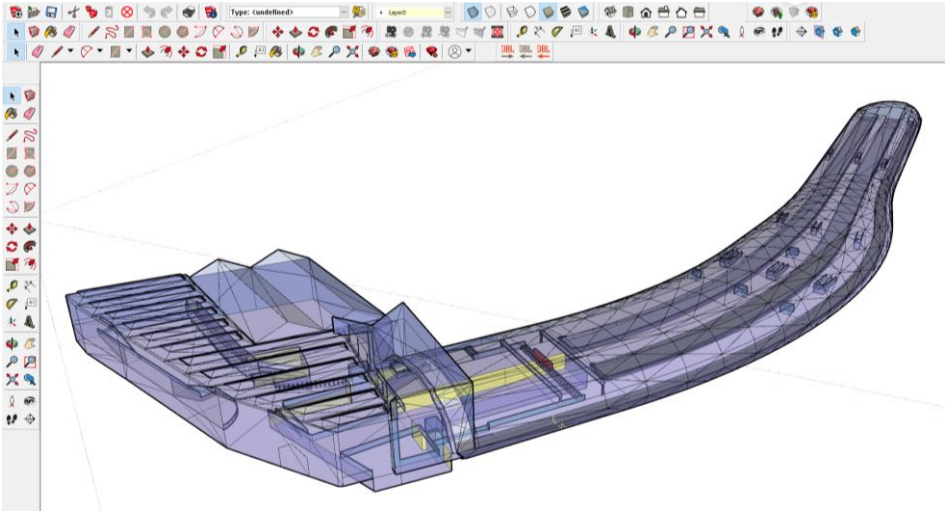



If you look where your project is saved there will be a new folder called **Your Project Name**_WinControl. This contains your DDS beam file.

The folder contains the two files needed to upload the beam settings to your DDS steered Intellivox via the WinControl Software package.



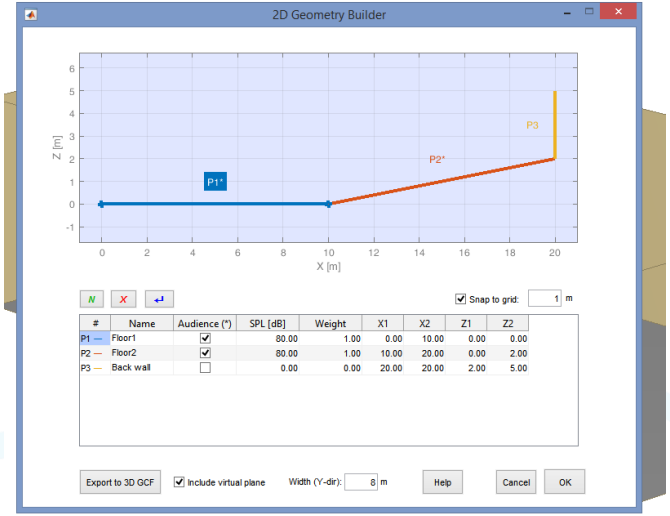

Once the full run has been completed you can also export the directivity files out from DDA to be used with Catt Acoustic, Odeon or EASE Acoustic modelling Software.

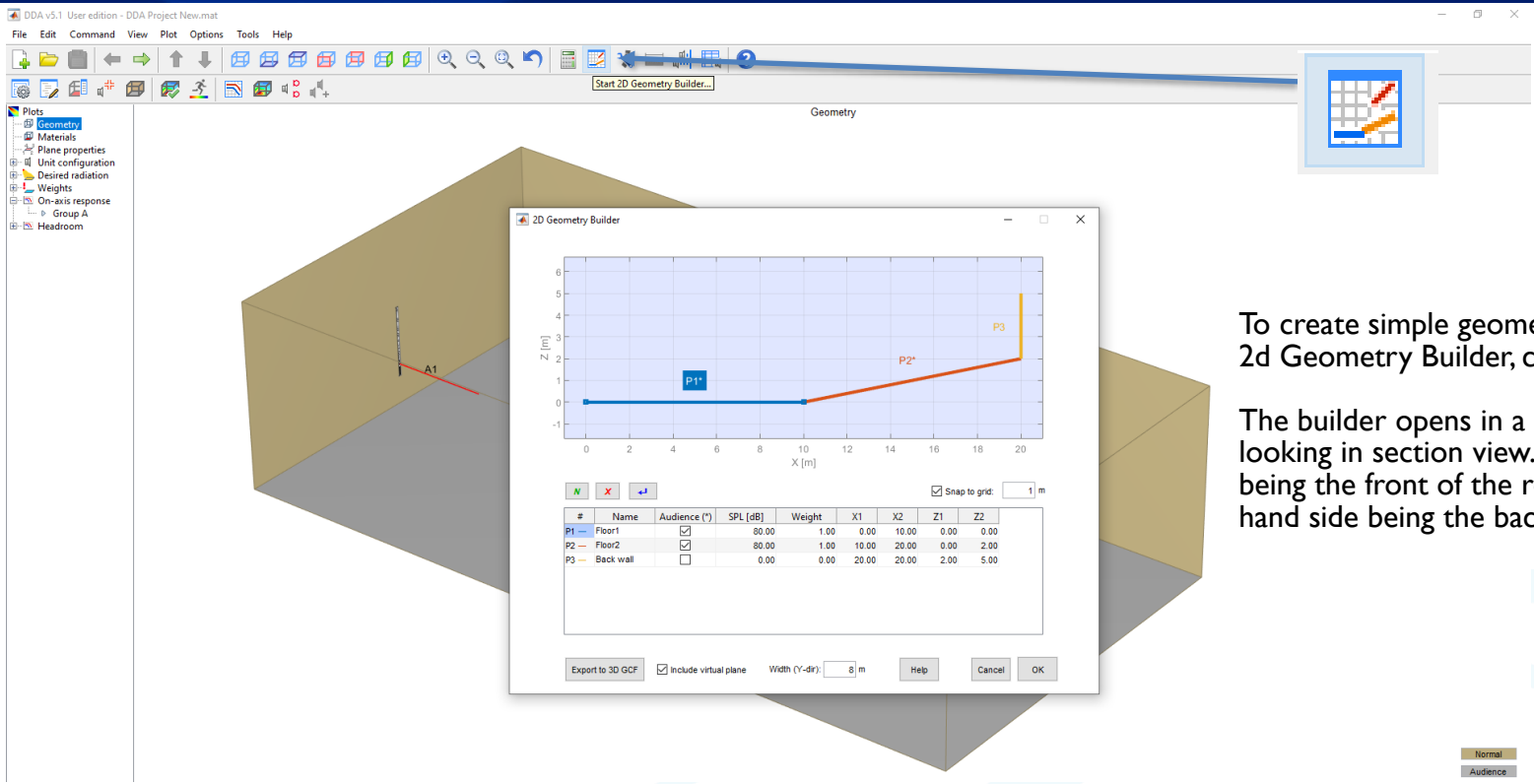


To import geometry into DDA you can export the geometry from SketchUp modelling software using the JBL plugin.

Import geometry directly from Odeon/CATT Acoustic by exporting the geometry to a .CAD file or a .XFC export from EASE

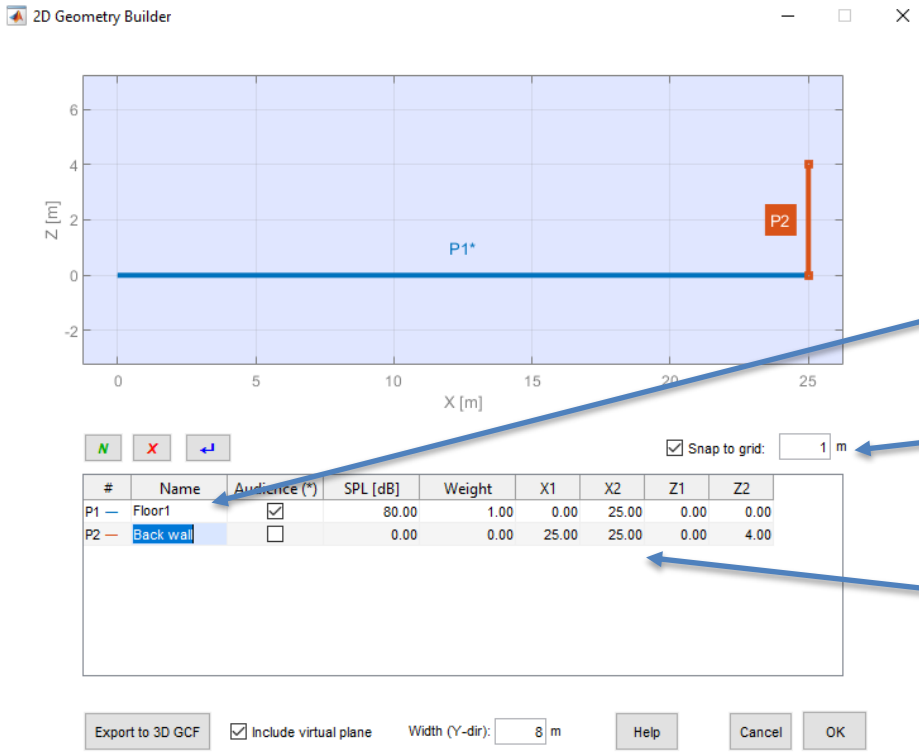
Or create simple geometry using the DDA 2d Geometry Builder.






To create simple geometry using the DDA 2d Geometry Builder, click on this button.

The builder opens in a separate window looking in section view. With 0 on the left being the front of the room and the right hand side being the back of the room.




– Creates a new Plane

– Delete Plane

– Reverses the plane

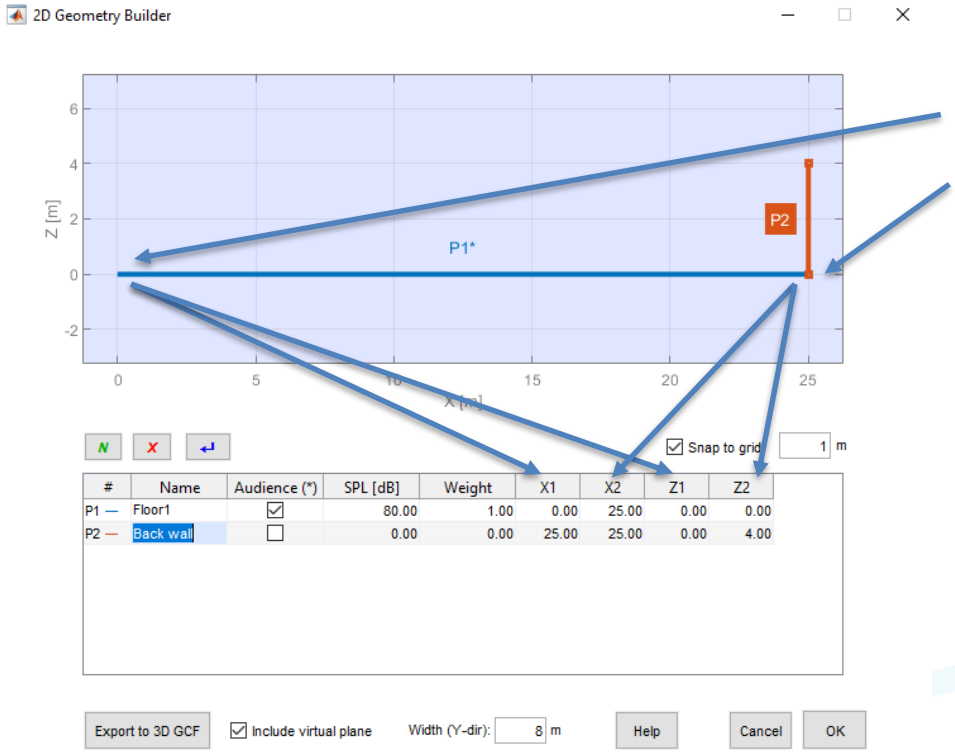
You can label the plane with a name (not required)

Select whether or not it is an audience plane by clicking on the tick box.

Select the resolution you want to build the model either in 1m grid or 0.5m, etc.

Enter SPL and weight requirements for your audience plane (if you are building the model for a DDS array).

Then we have the X1, X2 and Z1, Z2 coordinates, which can be entered manually or by clicking on the ends of the plane and dragging them into position.




X is the horizontal plane and Z is the vertical plane.

Position X1 / Z1

Position X2 / Z2

Plane 1 has its first location at X1, Z1

X1 = 0 and Z1 = 0  this is the start of the plane

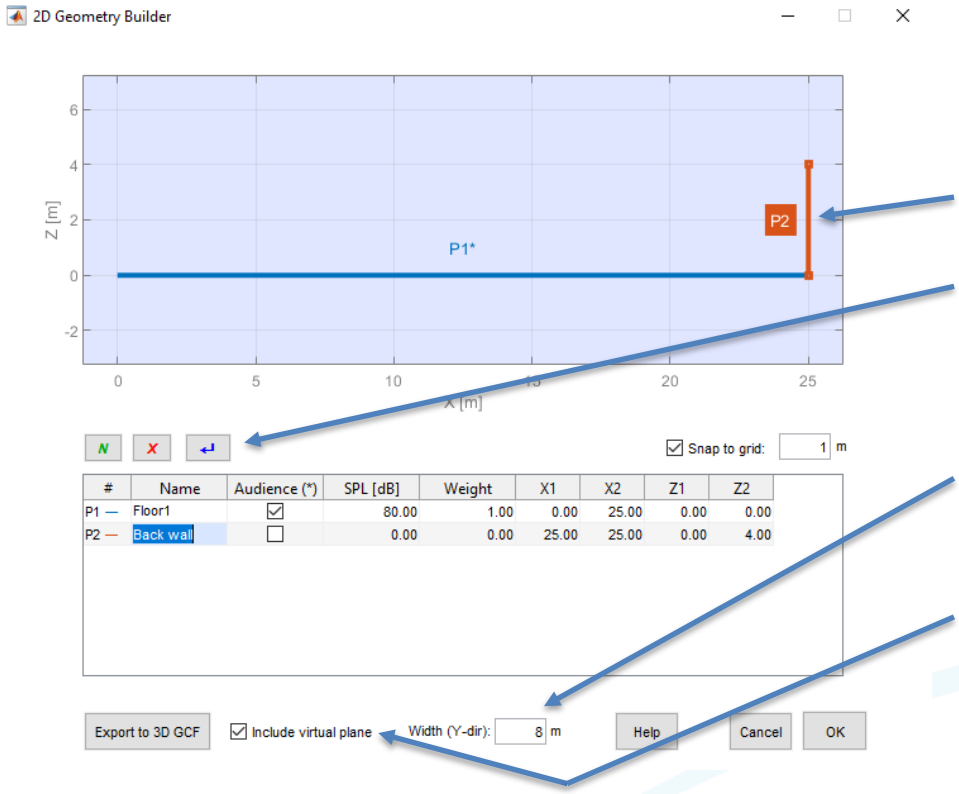
X2 = 25 and Z2 = 0 This is the second location 25m away

These locations are then joined to create a plane.

To build plane 2 – the back wall

X1 = 25 and Z1 = 0

X2 = 25 and Z2 = 4



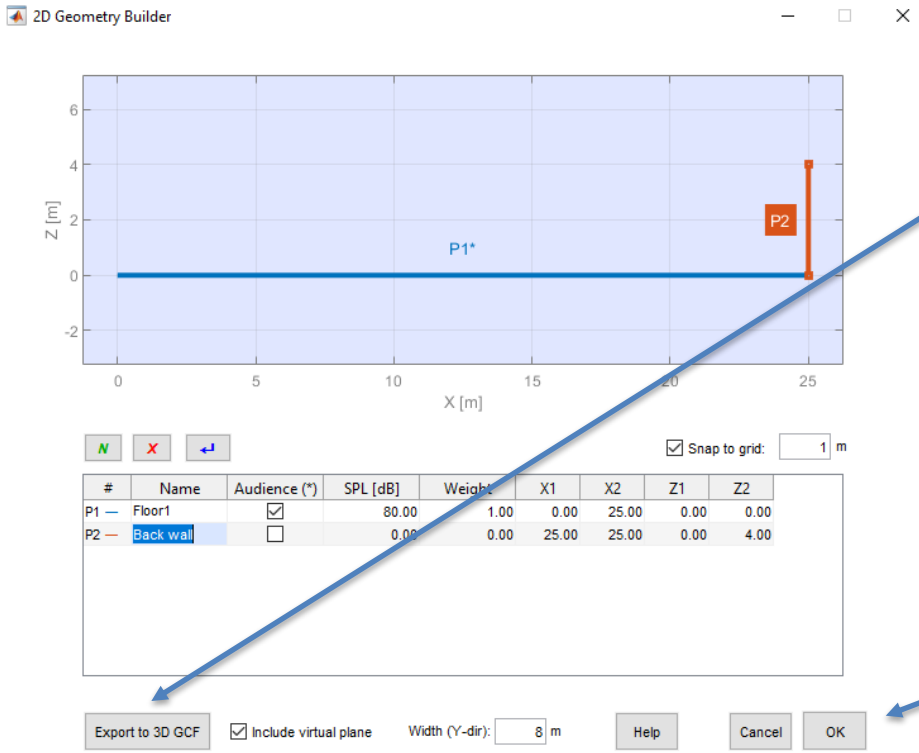

If you click on a plane and select it, such as plane 2 in this model, we can then click on the ends of that plane and drag them to our desired positions.

The plane numbers should always be 'inside' our model to ensure the plane is orientated correctly (facing into the model).

If your plane is facing the wrong way you can select the plane then click on 'reverse plane' to orientate it correctly.

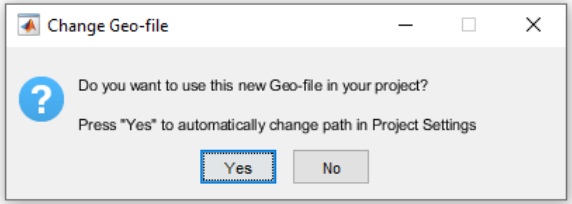
Once you are happy with the location of your planes you can then define the width of your model by entering a value here in metres.

A virtual plane can be added down the centre of the model if the tick box is selected, this will map the audio dispersion coming from the array.



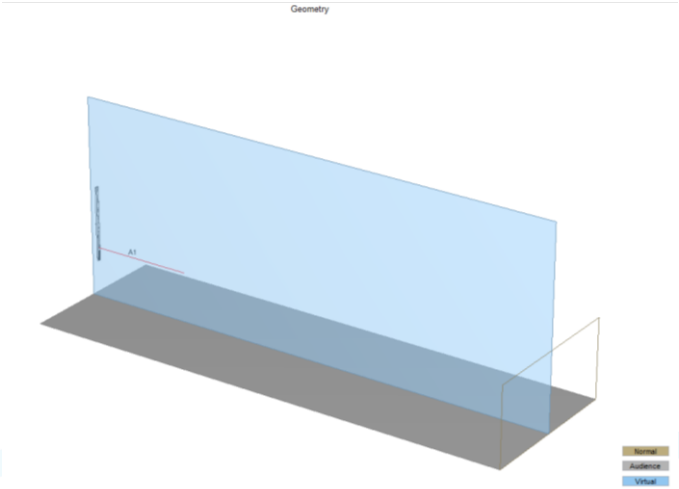

Once you are happy with the model you can click on 'export to 3D GCF' which will prompt you to save the geometry to your project folder.

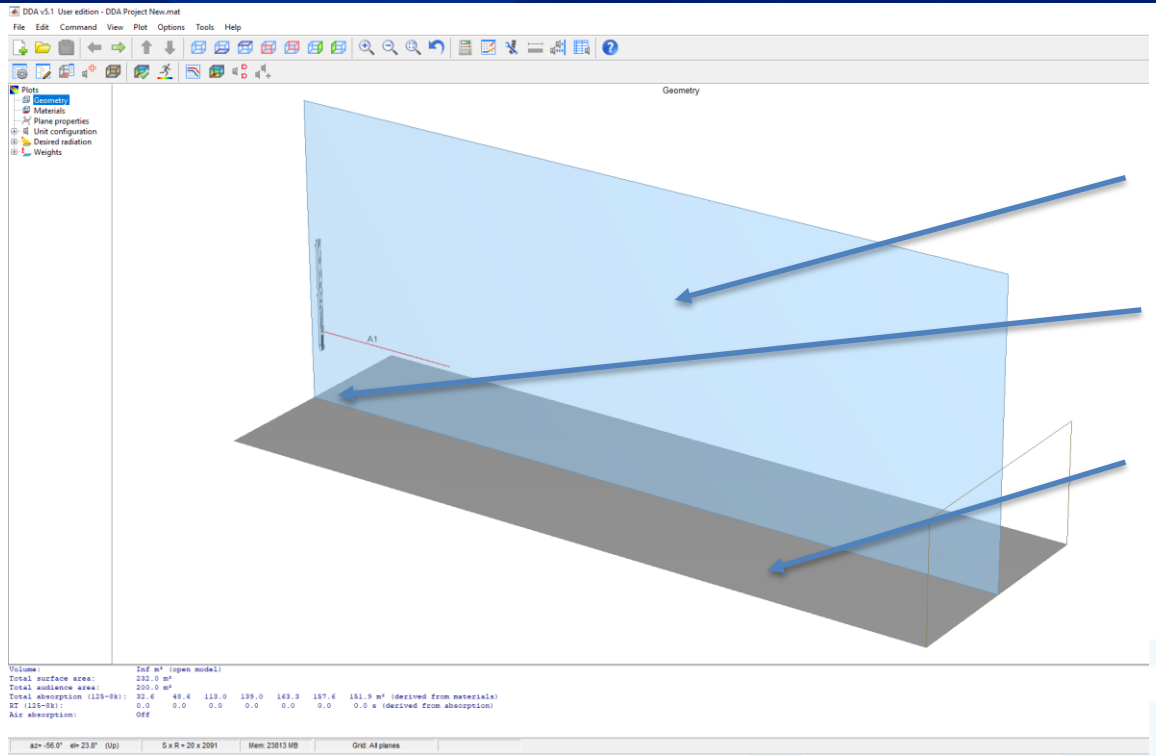
A warning box will open after the geometry is saved giving you the option to use the geometry in your project




Finally Click on Ok to temporarily close the 2D Geometry Builder.

When we then view the project settings window we can see the Geo-file has changed to the file used in the 2D Geo Builder and we can use it straight away by clicking on Ok and then build all.



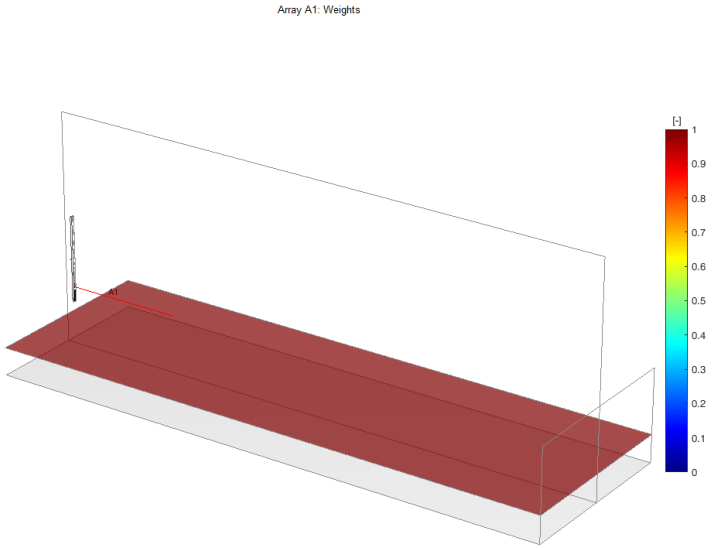



The built geometry will then be displayed

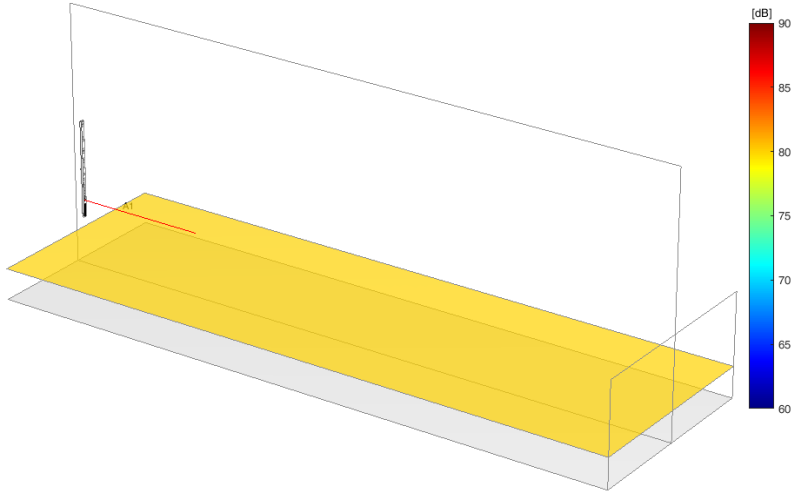
The blue plane through the centre is the 'virtual plane' this has no effect on the dispersion from the array and is there as a visual guide only.

The Intellivox is positioned at the X,Y, Z (0m,0m,2.2m) position as defined within Group A1 in the project settings window.

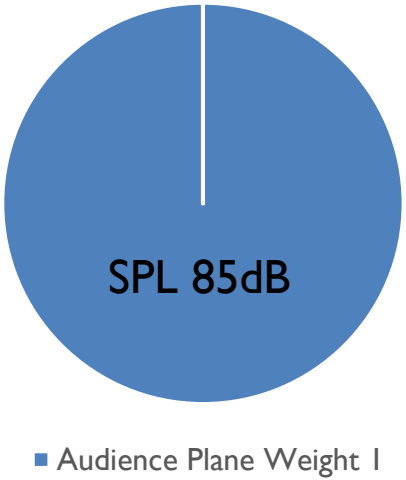
The grey area indicates the audience plane



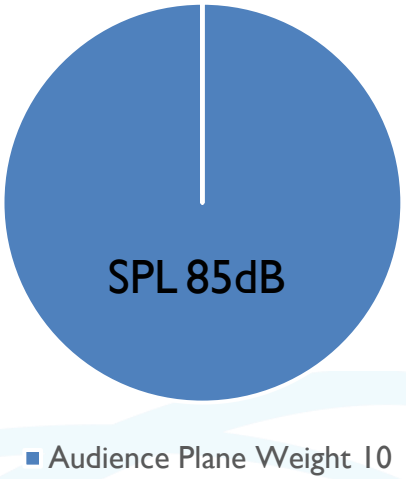

The ‘weights’ and ‘SPL’ are as we defined within the 2d GCF Builder.



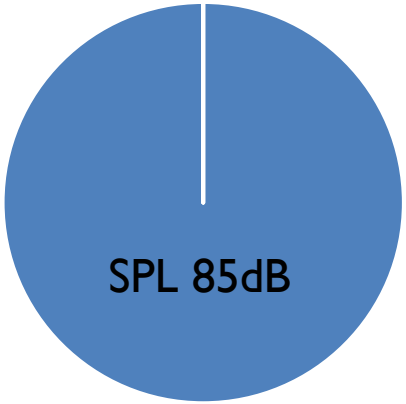
## Model Total Plane Weights



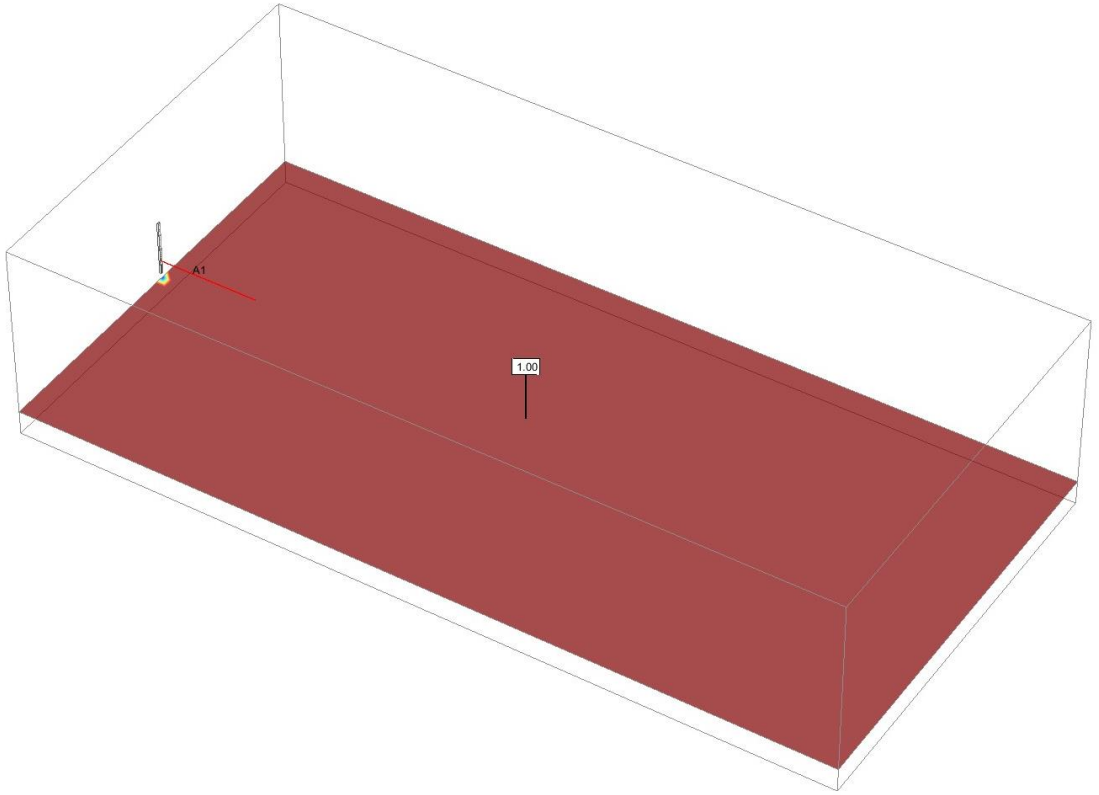

## Model Total Plane Weights



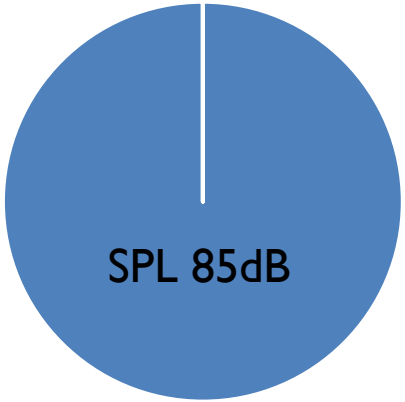
# Model Total Plane Weights



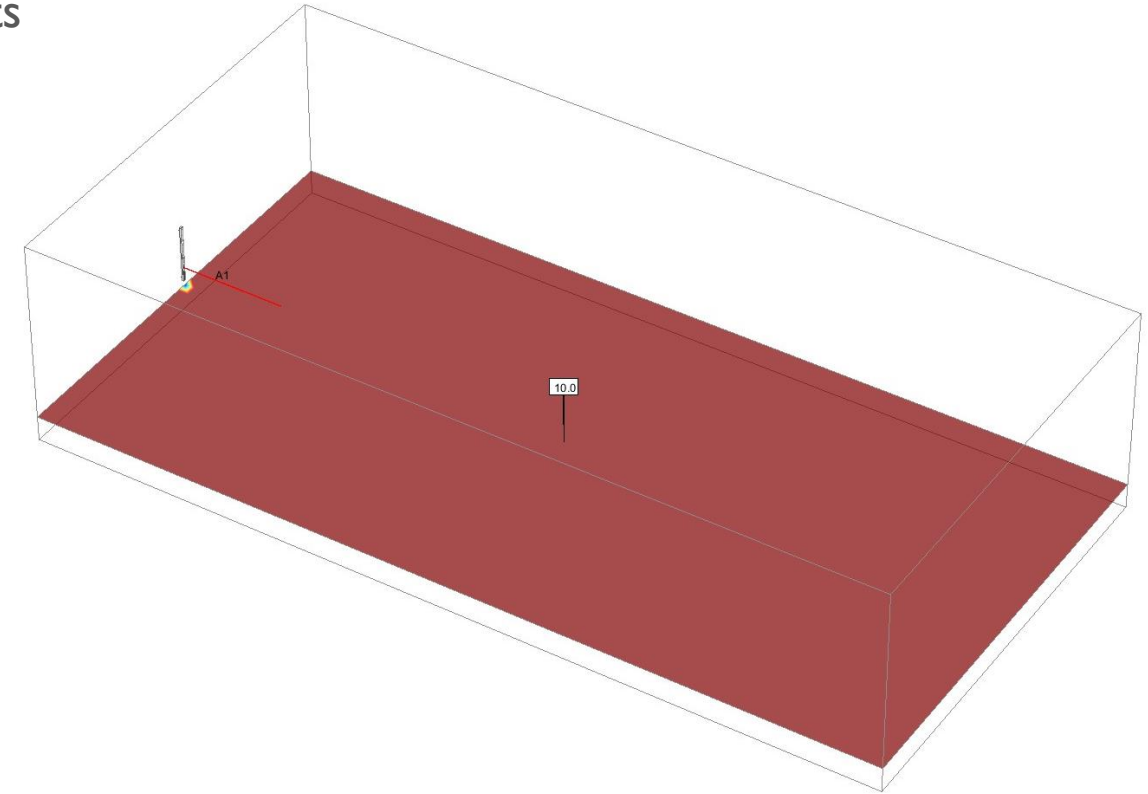

- Audience Plane Weight 1



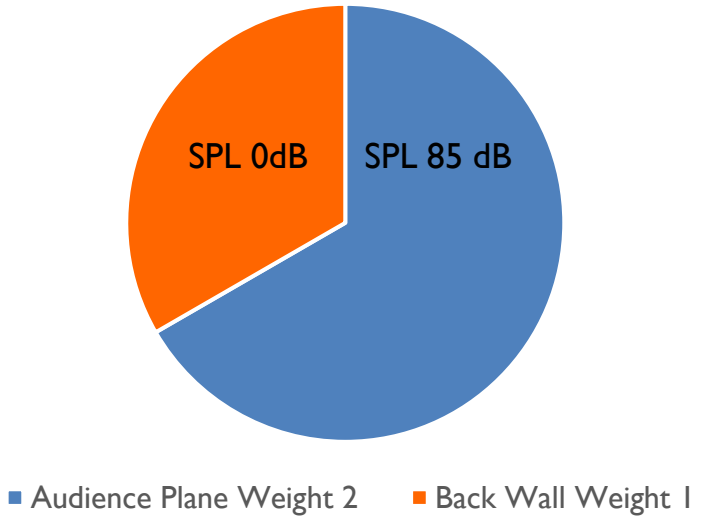
# Model Total Plane Weights



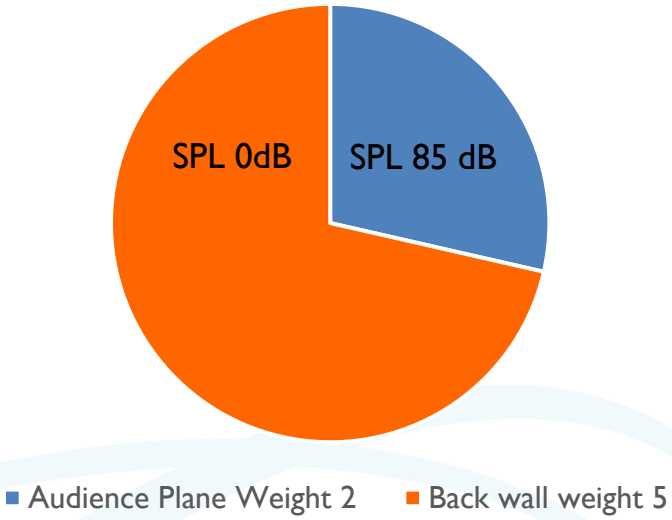

- Audience Plane Weight 10



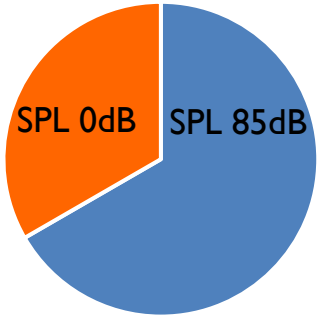
## Model Total Plane Weights



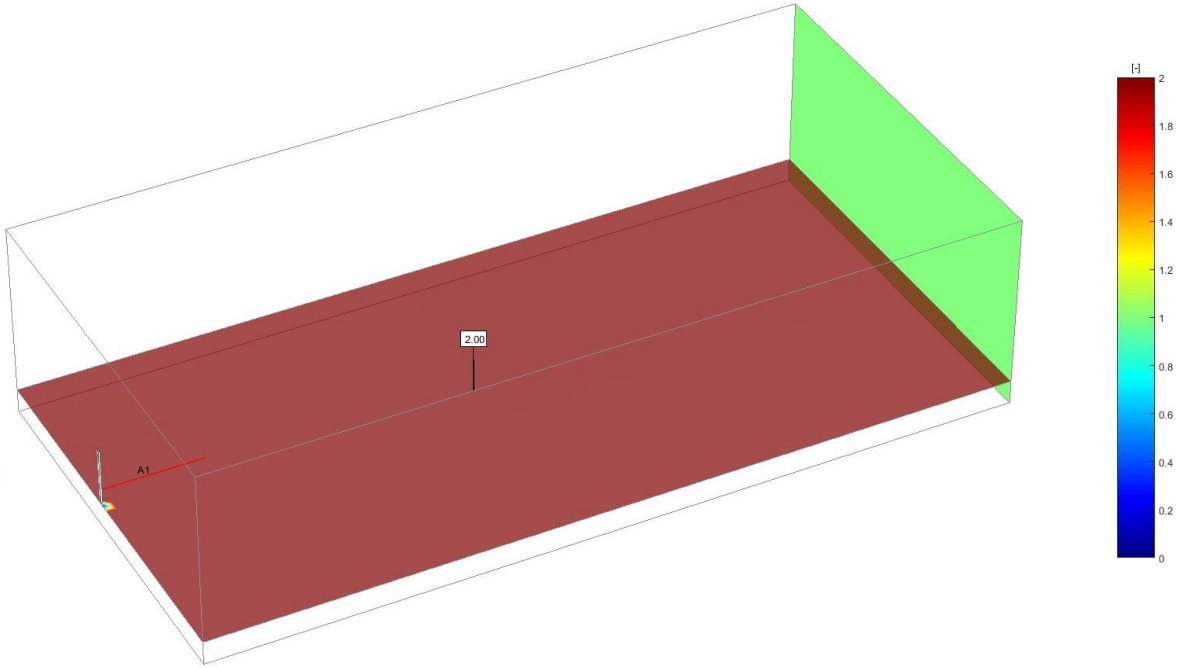

## Model Total Plane Weights



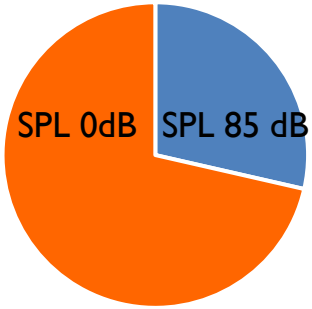
# Model Total Plane Weights



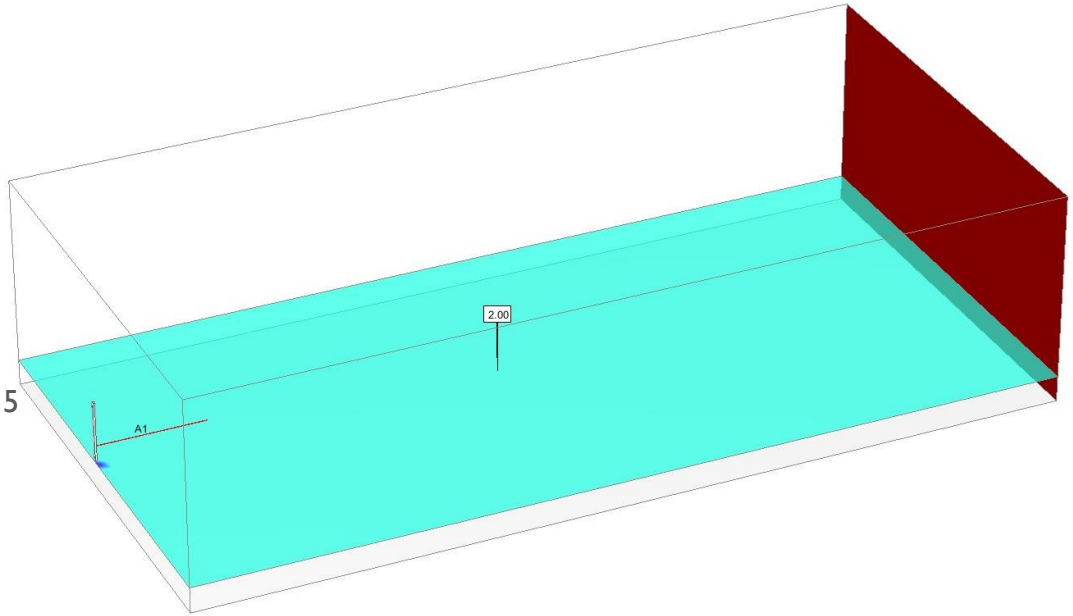

■ Audience Plane Weight 2 ■ Back Wall Weight 1

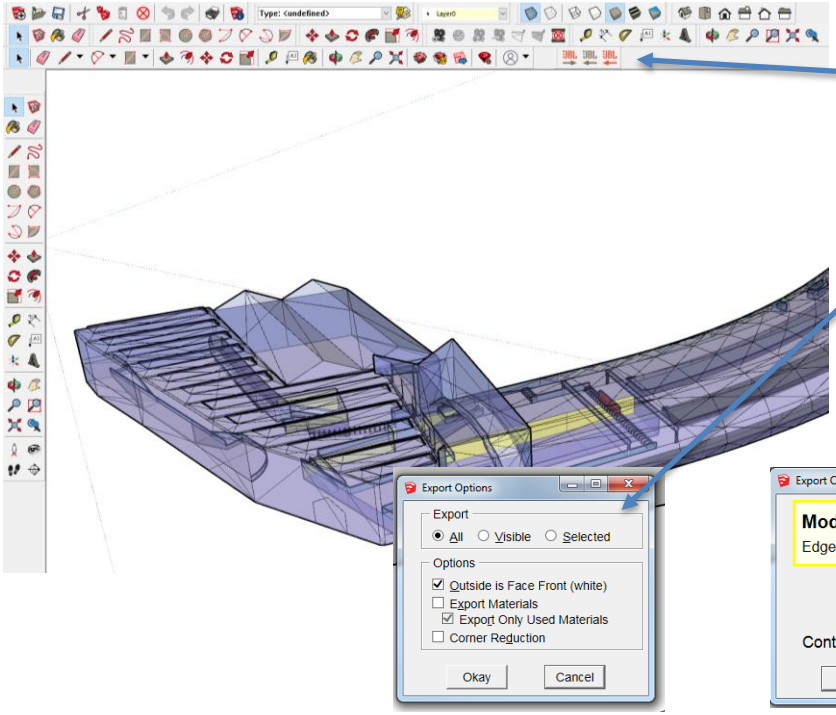


# Model Total Plane Weights




■ Audience Plane Weight 2 ■ Back wall weight 5



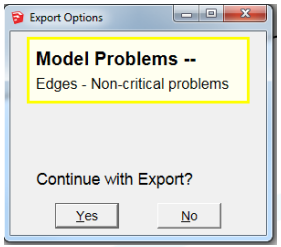


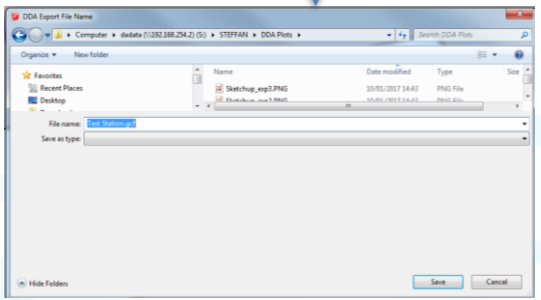

To import a model from SketchUp, install the plugin for SketchUp (available on the JBL Pro website). When you have completed building your model within SketchUp click on the export button

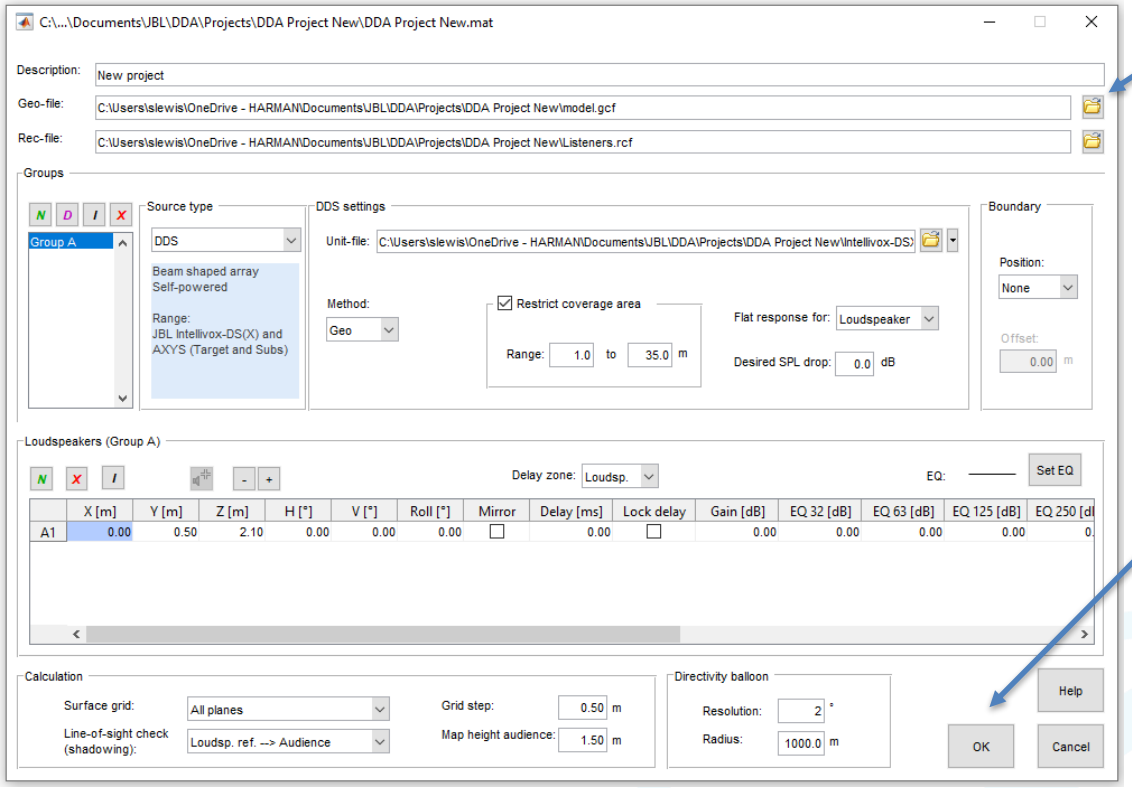
and a window will open with a few options

You may get a warning your model may have some problems which may need to be resolved

Then name the file and choose where it should be saved. It should also include the '.gcf' file extension.



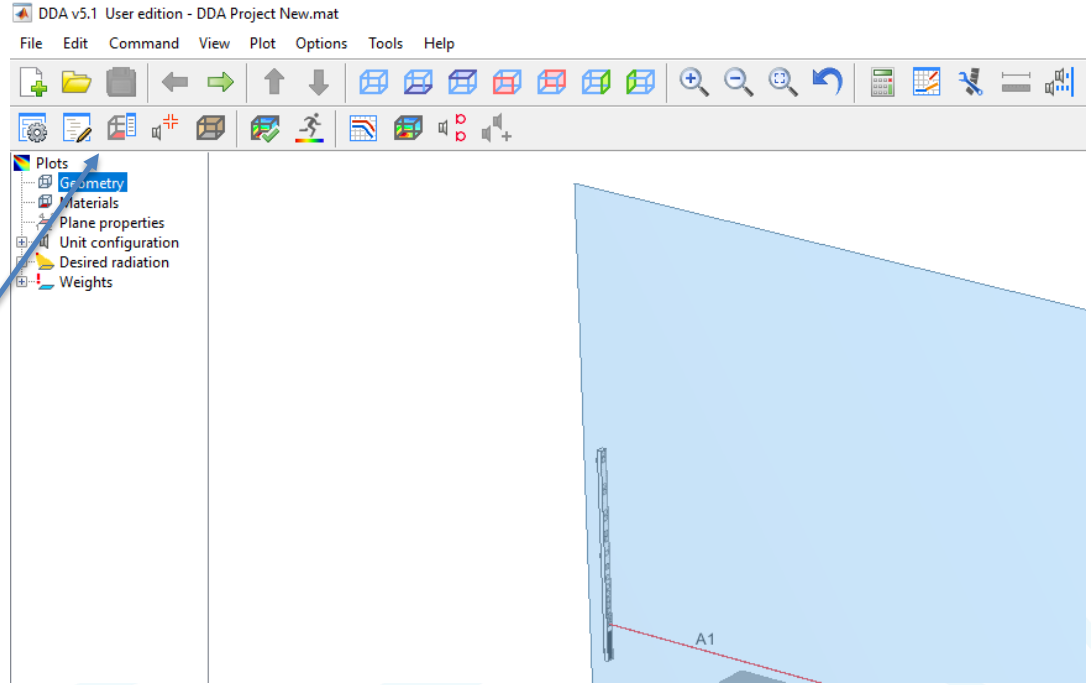


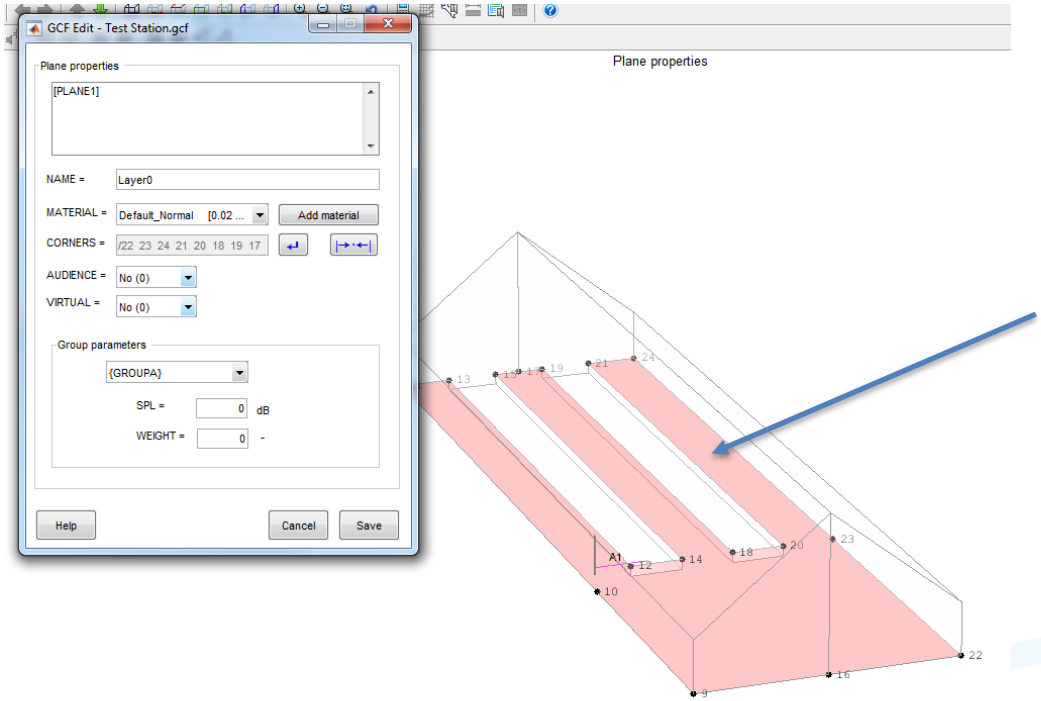

Open ‘Project Settings’ window and click on the Geo-File folder and browse to where the file is located.

Then click on Ok and ‘Build Geometry’


A warning will then be displayed saying 'no audience plane set'

Click on 'Edit Configuration files' and a window will open.



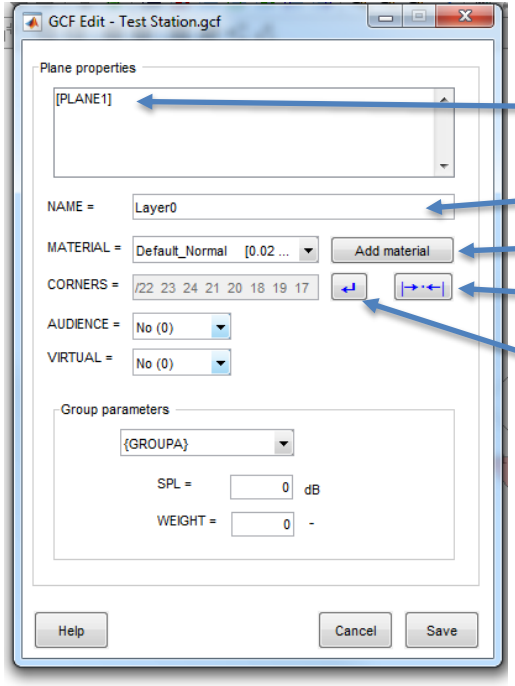



Edit plane properties window

Click on the audience plane with your mouse, if another plane is selected click again in the same place to reach the plane behind.

To select multiple planes press the space bar

Surfaces within the model should be displayed in Pink to indicate your model is orientated correctly.




Edit Plane Properties window

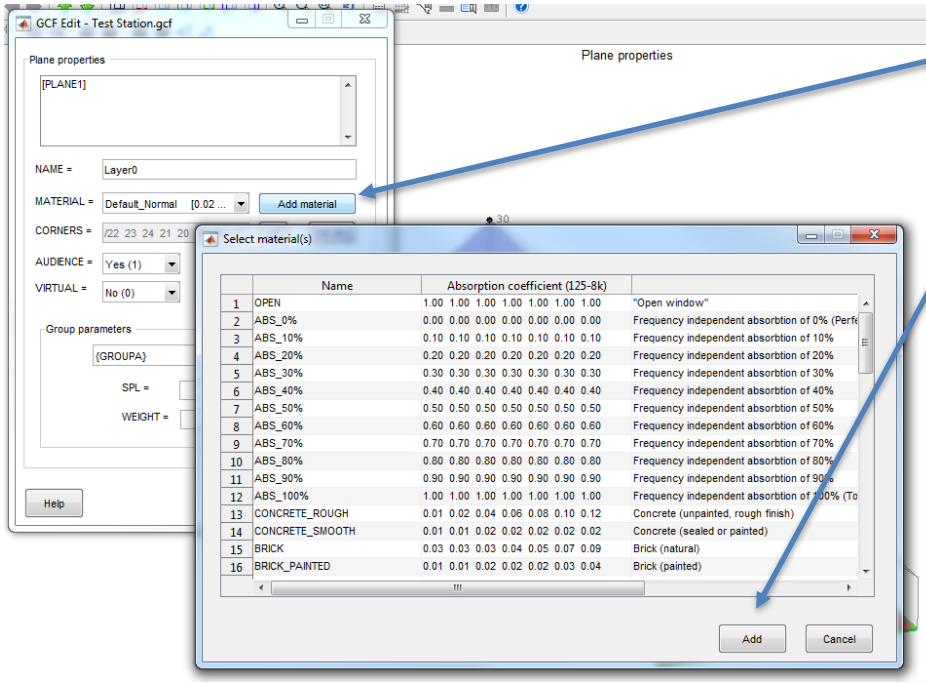
Selected plane(s)

Name of the surface plane selected (from model file)

Define surface material (not necessary to create a beam file)

Look from centre of the model out to orientate planes correctly so they all face pink into the model

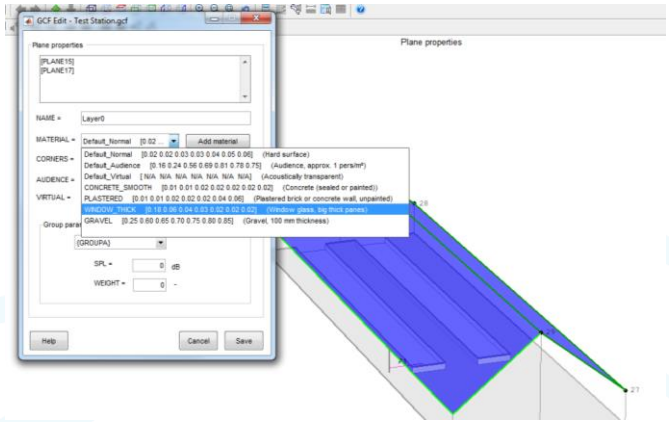
Reverse selected surface plane

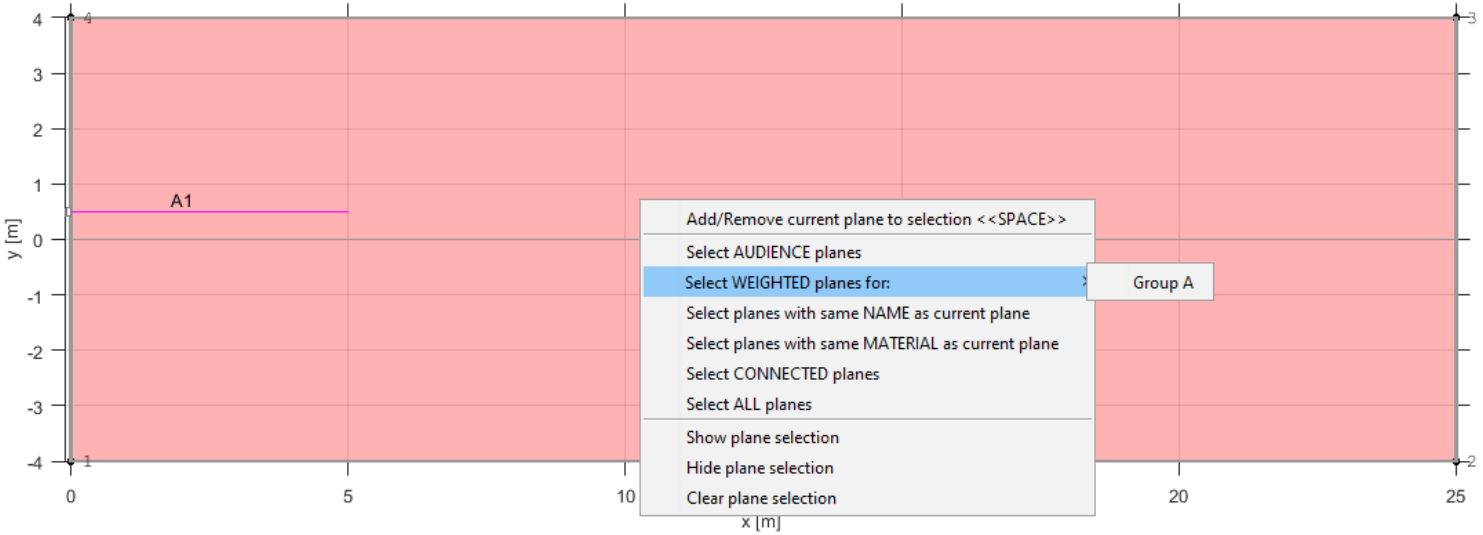



If you are looking to predict the reverberation time of the model you can add materials (Optional).

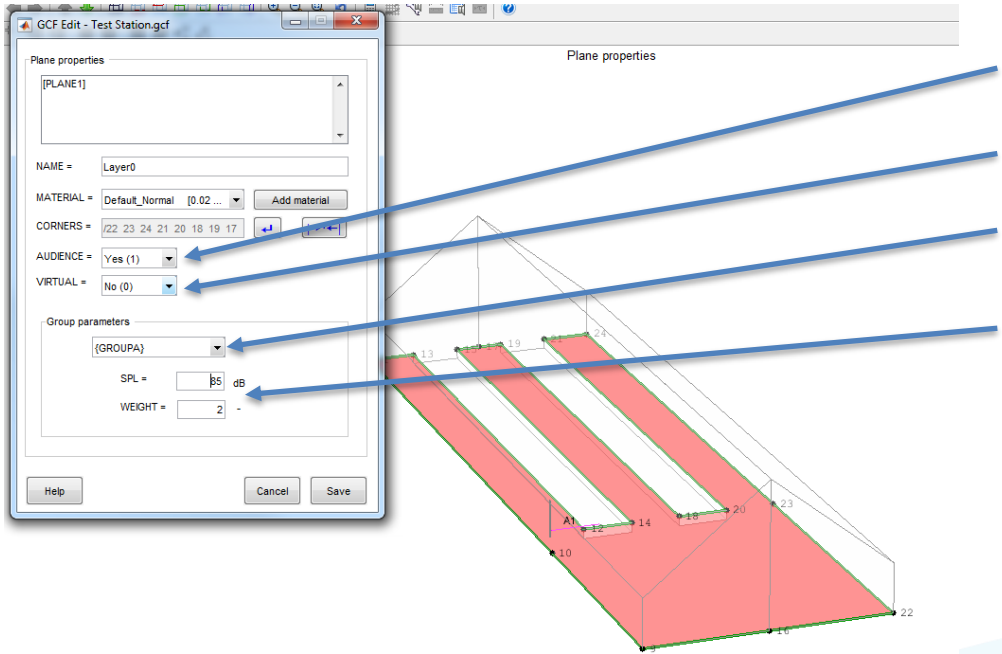
Select the multiple materials required from the drop down menu

Select Planes required for material addition, using the space bar if required, then use the drop down to assign materials to those planes.






Plane Properties View – To speed up plane selection you can right click on the screen to select previously defined Audience planes, Weighted planes for each Group, select planes with the same Name, select Planes made of the same Material, select connected planes, select All planes and show/hide and clear current plane selections.




Select the floor plane and define it as an audience plane by selecting yes.

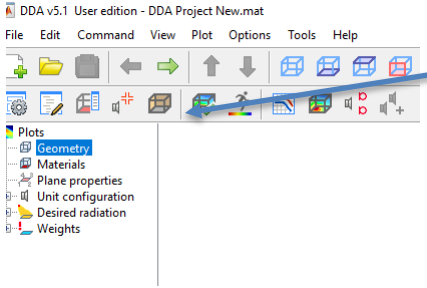
If you have built a virtual plane within your model then click here to turn it on or off.

Select which Group of Intellivox you would like to weight the planes for.

Define the SPL required and the weighting factor.

The weighting is a ratio of planes weighted within a model as explained previously. In this case we are only interested in weighting floor planes to define our beam settings.

Click on Save.

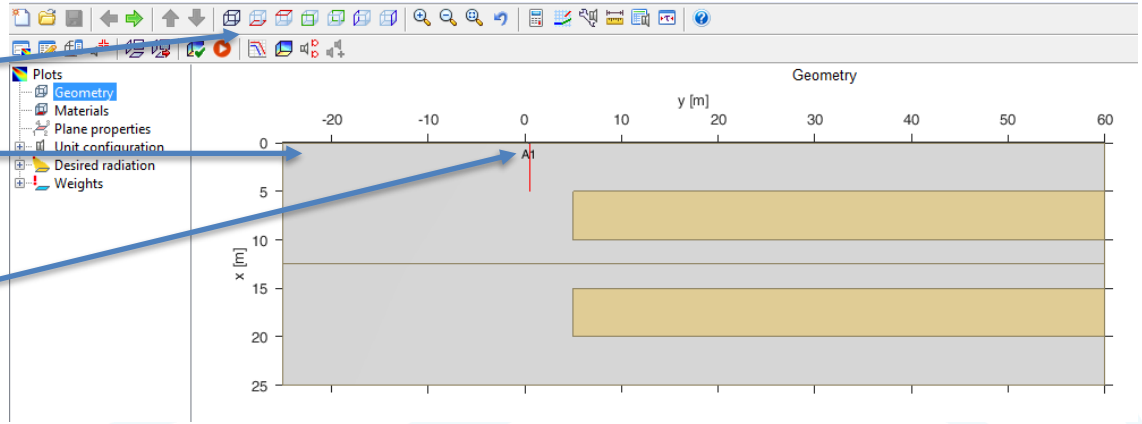


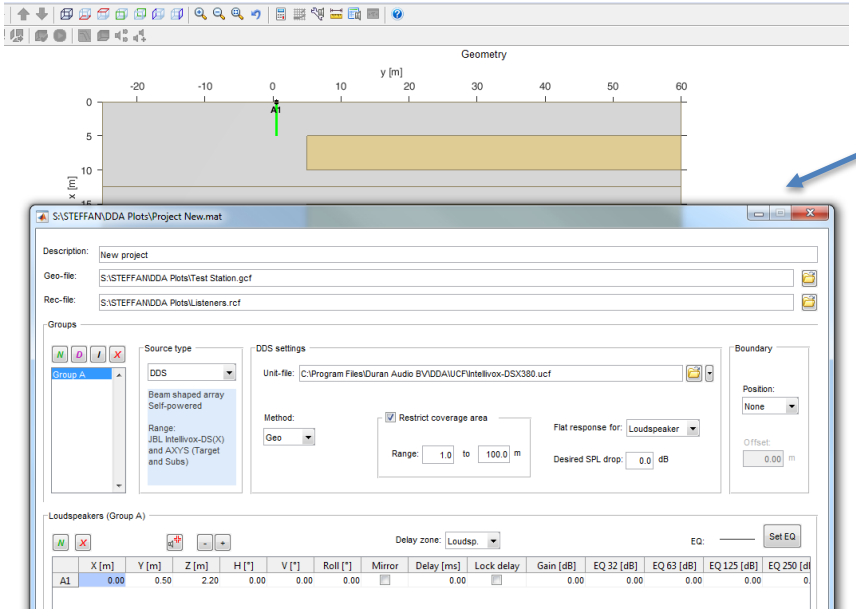

click on ‘Build Model’ to apply the changes.

In geometry view click on XY Projection view

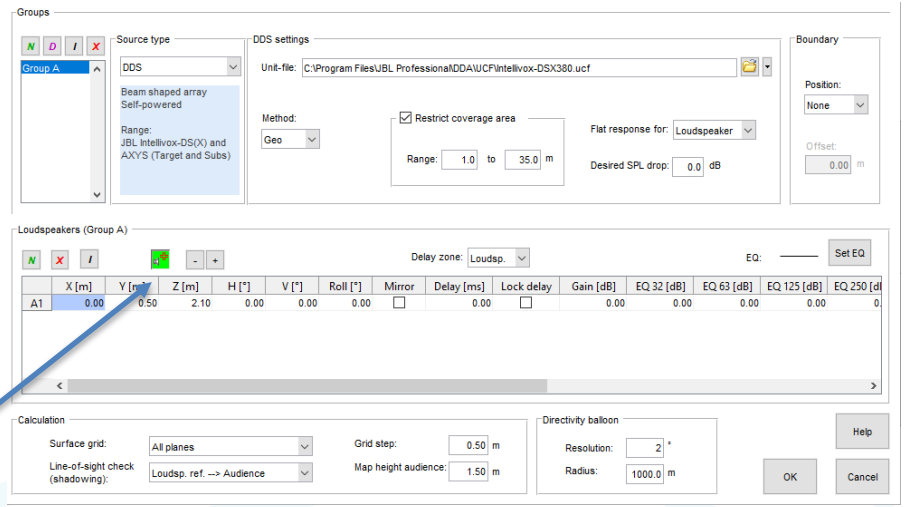
Now the model has been built we can see the floor area has turned grey indicating it is an audience plane.

We can also see the Intellivox is not pointing in the correct orientation.

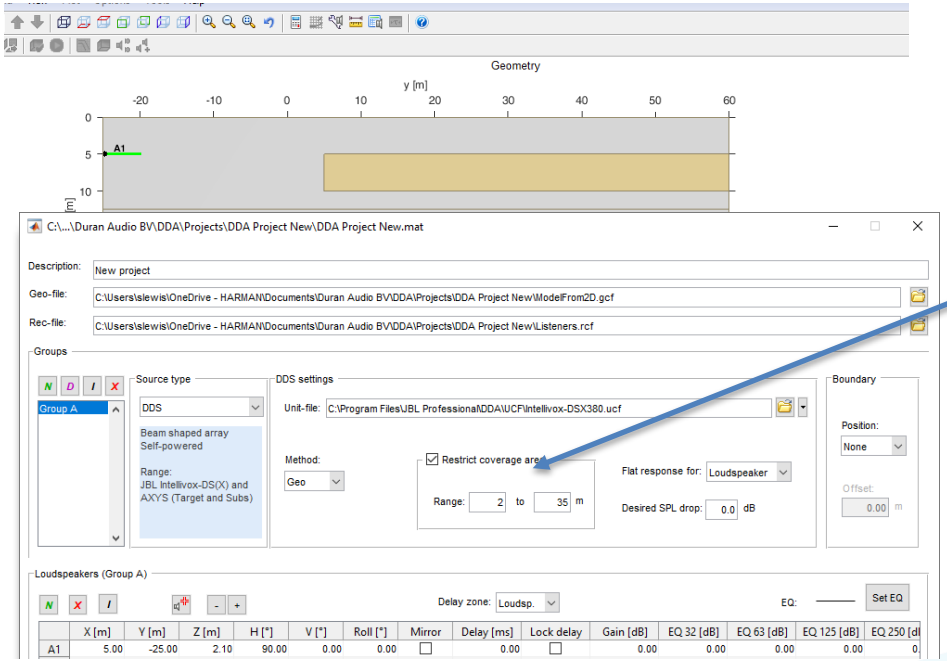





Click on project settings and position the window so you can see it and the plan view (xy) geometry.




Click on ‘Set loudspeaker position’ button, the button will change green, click on the 2d geometry and the speaker. Will be positioned Adjust the H angle between 0 and +/-180 degrees to get the correct aiming angle

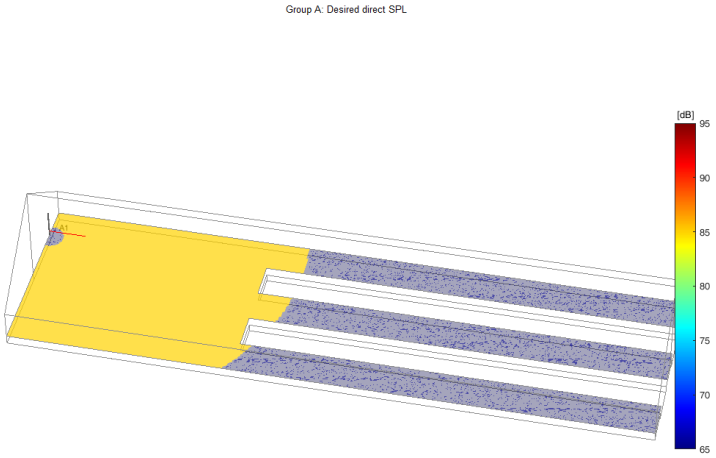



With our Intellivox in the correct position and height, the next thing to do is to ‘restrict coverage area’ as the audience plane is over 80 metres long, outside the range of a DSX380.

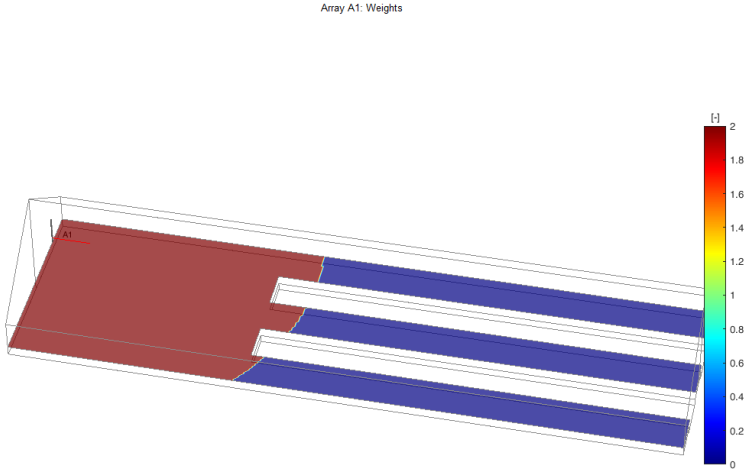
Or we could either look at using a longer array to cover the 80 metres, such as an Intellivox DSX500.

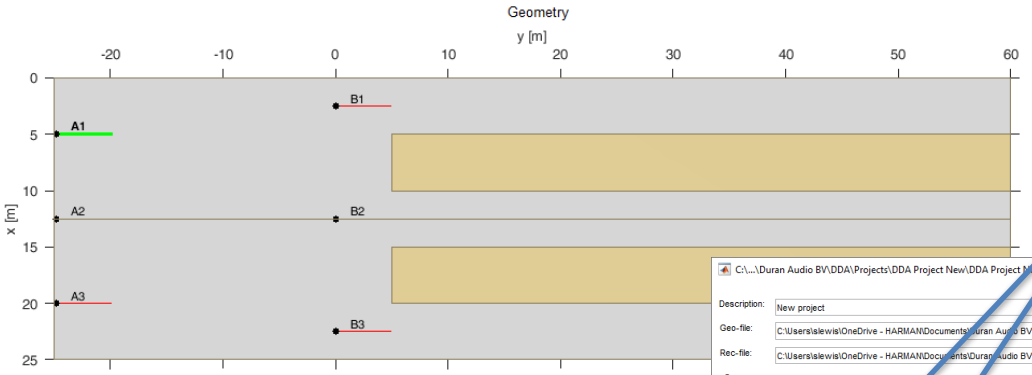
With an Intellivox DSX380 the typical throw of this unit is around 35 metres, we can change the ‘restrict coverage area’ to  2 to 35m.

Then click Ok and Build All



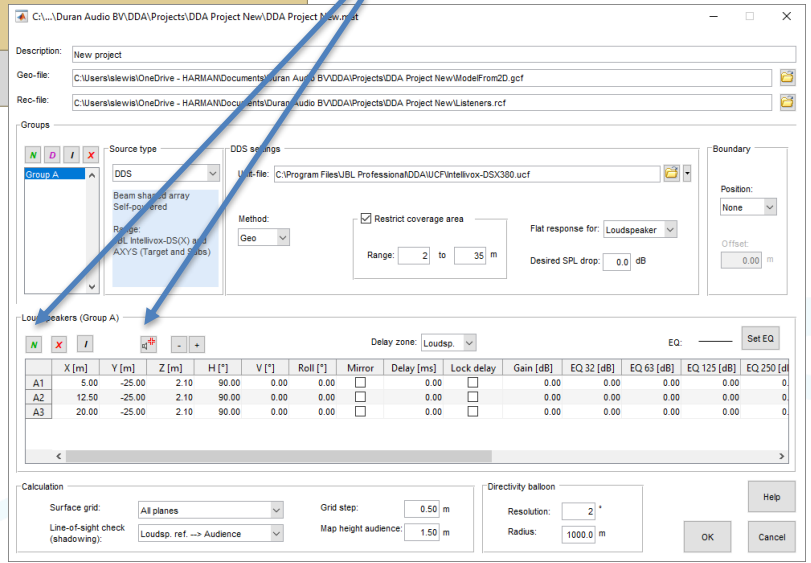

With the model built, if we look at the Desired Direct SPL and Weights we can see the clearly defined area the Intellivox is trying to cover.

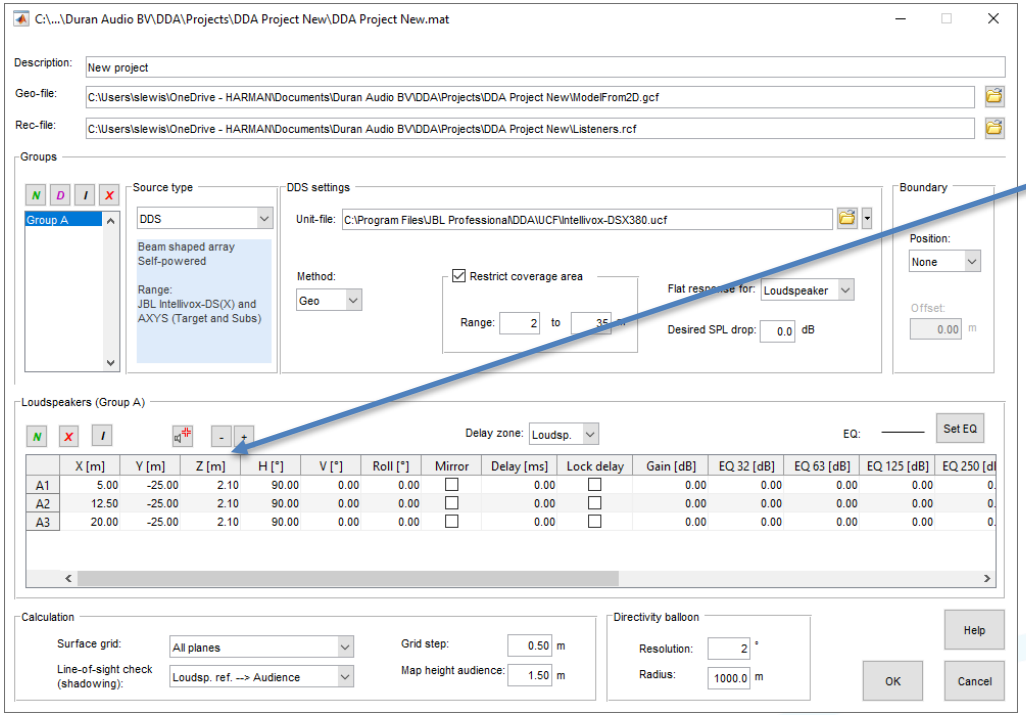




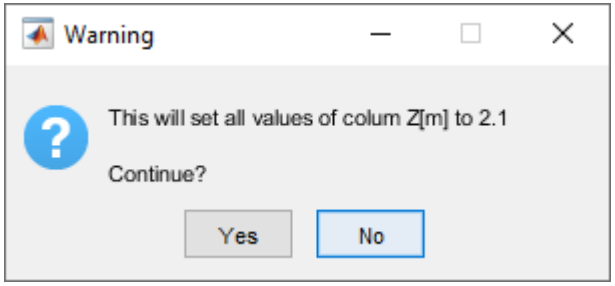

We can now follow the same process to populate the model with additional Intellivox to cover the audience area as required.

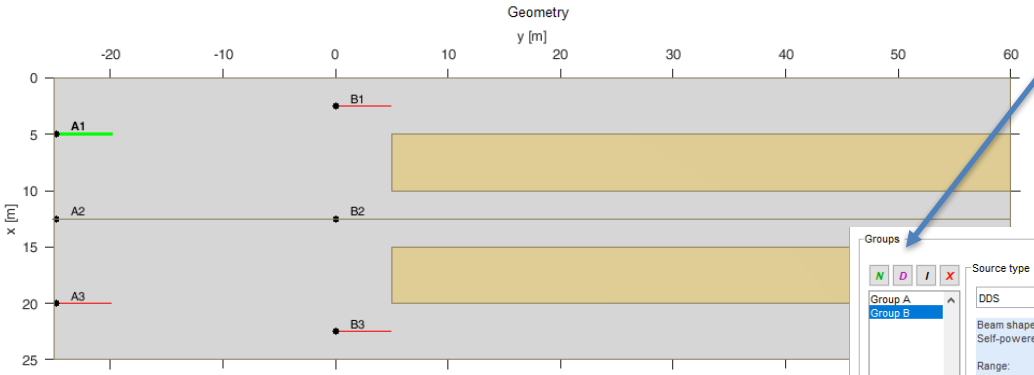
Click on Geometry view - plan view (XY projection) click on N then click on Set Loudspeaker position button and click on the geometry to position.






Right click on the top of any column to simultaneously change all of the values to all be the same as the selected value. i.e. change all the loudspeaker heights

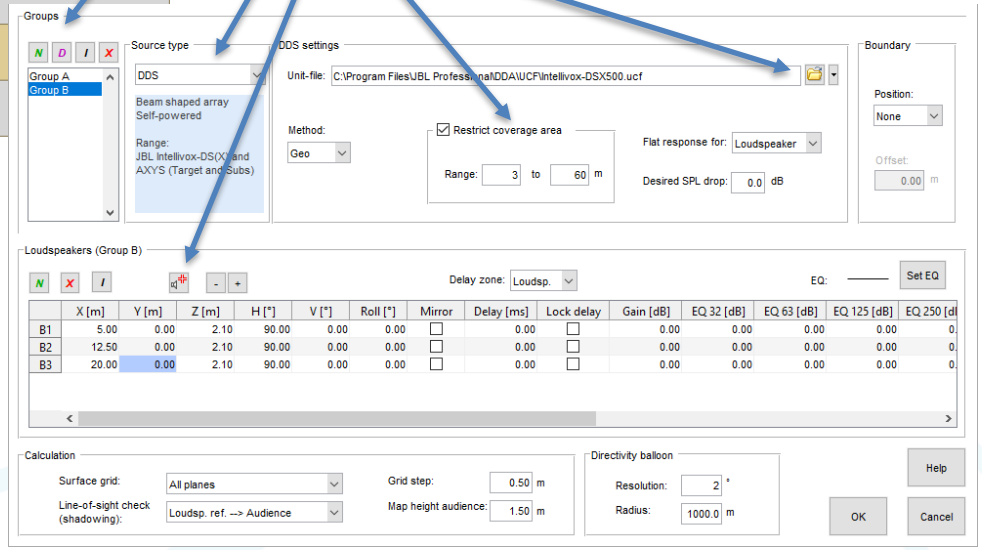


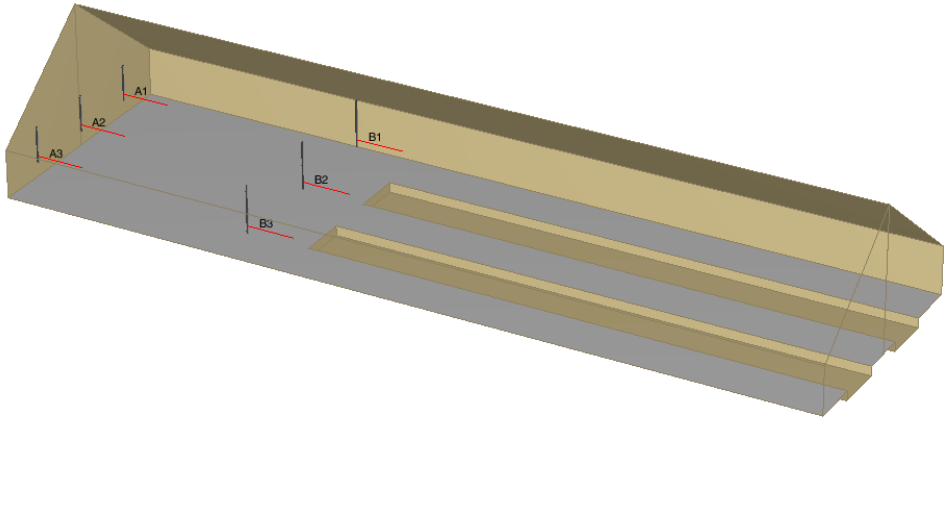



Click ok and Build geometry, click on edit plane properties and weight the audience plane for Group B as defined on page 10

For Group B click on N - Groups (create a new Group)

Select DDS, Intellivox type, restrict coverage area, then position the loudspeakers using the 'set loudspeaker position' button.

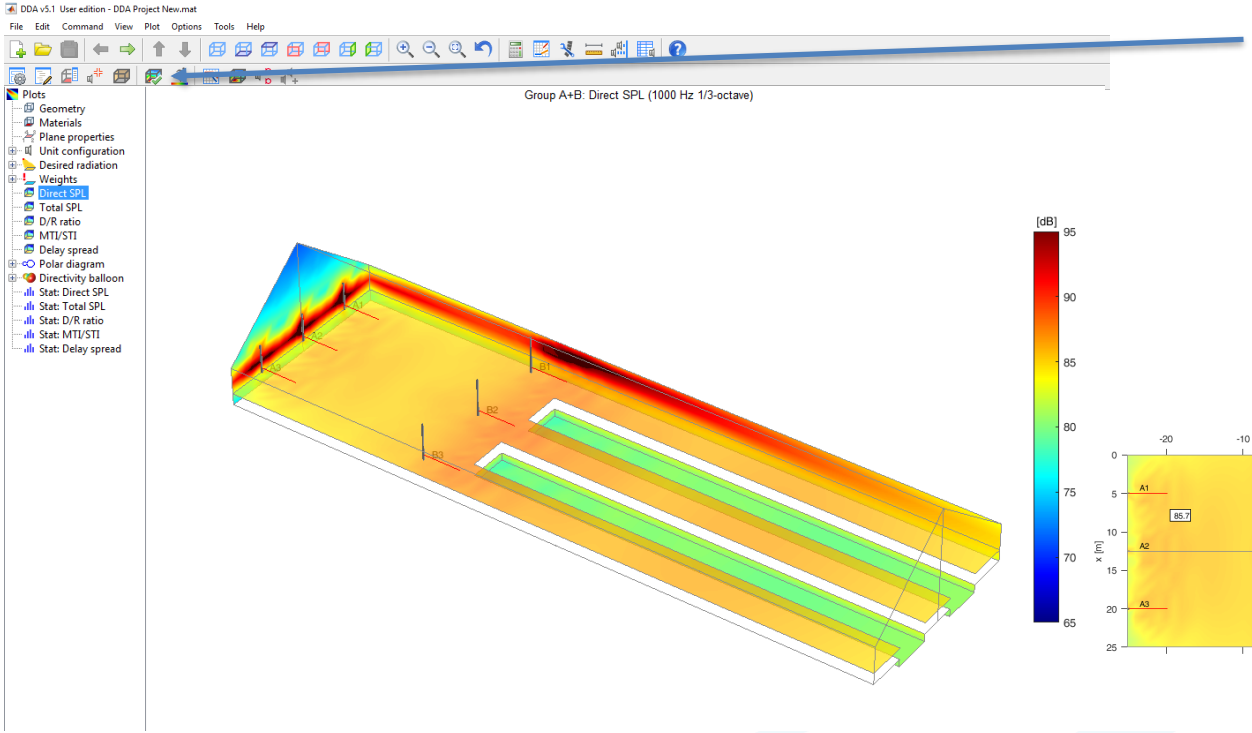


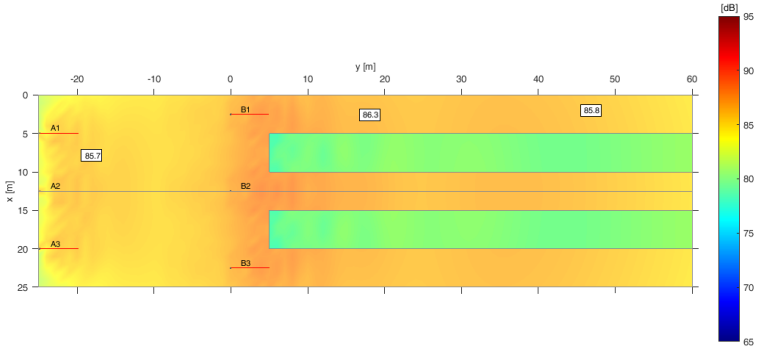



Group A – A1 defines the coverage for the DSX380, adding more units to this group copies the directivity from A1. The first array within the group defines the coverage pattern, this directivity is then copied when used for A2,A3,A4 etc.

Group B has a longer throw requirement, here we have utilised Intellivox DSX500 throwing 60 metres to the end of the platform area. Again we define the coverage for the first array B1 then copy this directivity for B2 and B3.

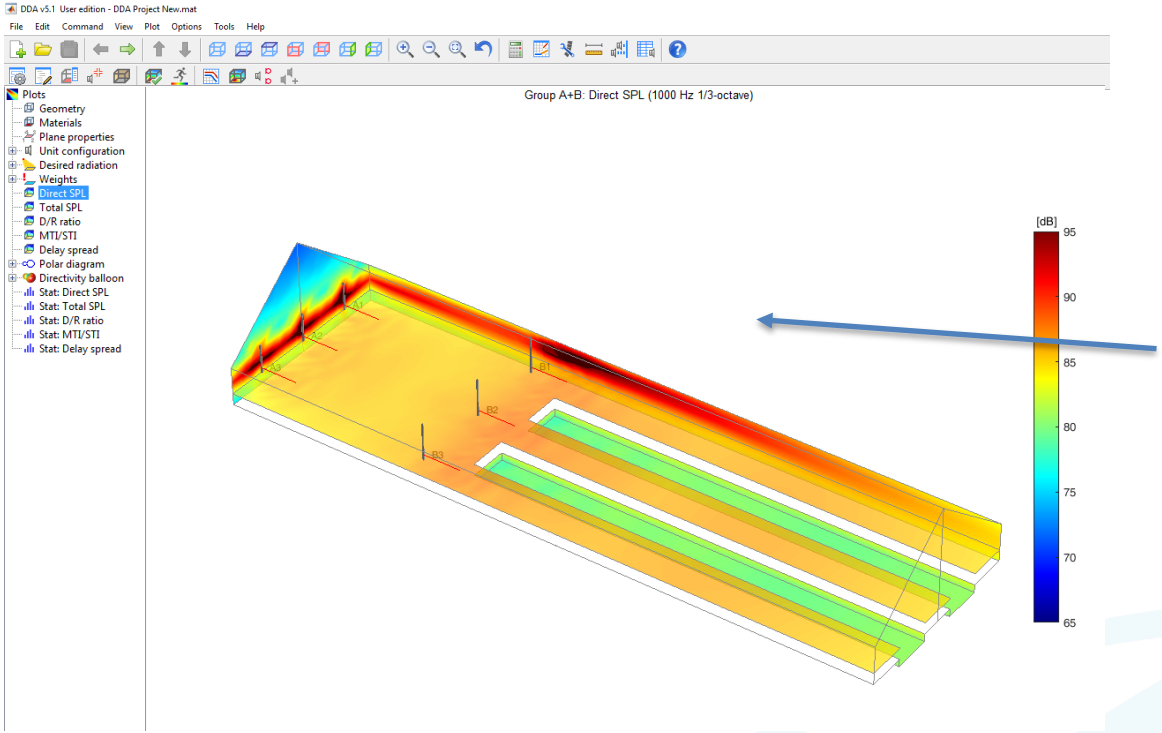
If for example B3 was only required to cover 40 metres then this would require a new group, such as C1 with the restrict coverage set to a maximum of 40m.



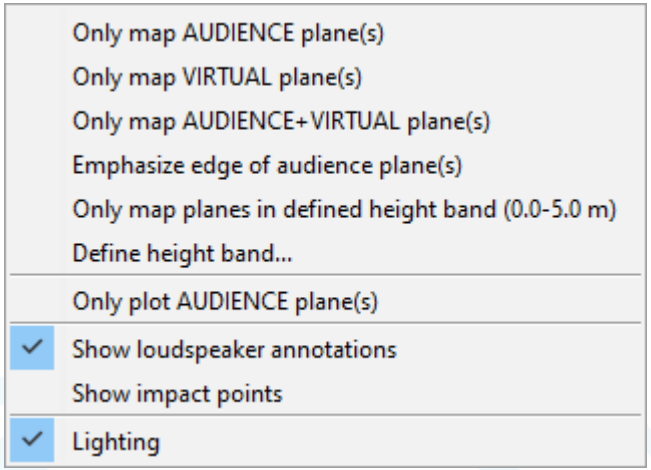

We can look at a trial run to check the dispersion of the system.

If any changes to the throw or speaker type are necessary they should be made before you complete a 'full run'



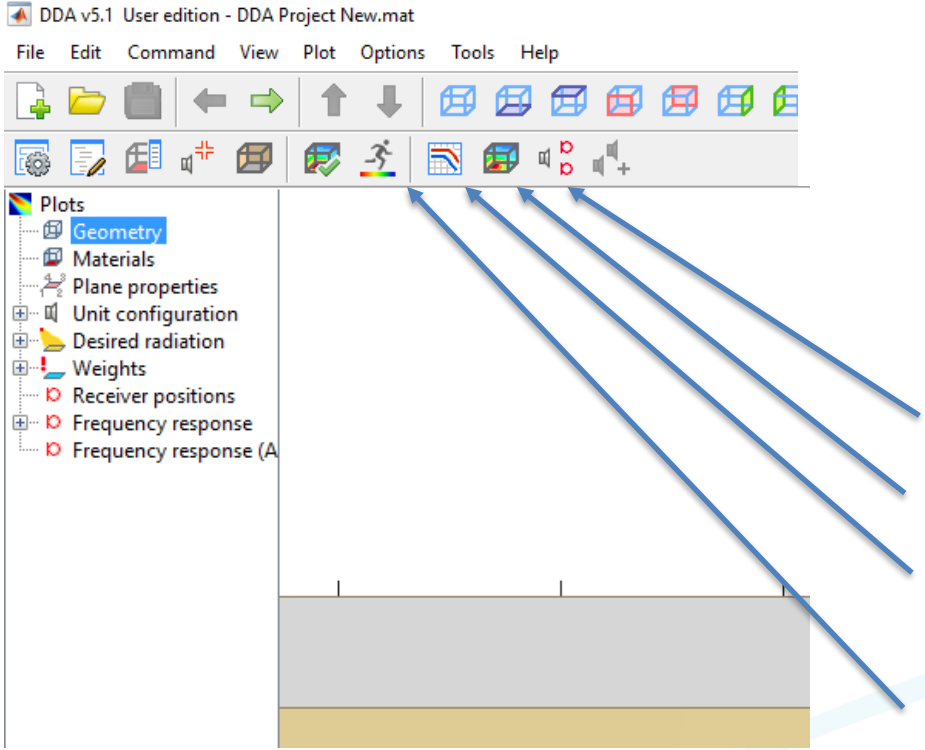

Right click on the screen gives these options

Height band plotting can be adjusted if you have multiple audience areas on different levels, such as a balcony that covers the main floor area.



# DDA

# FULL RUN




A Full Run calculates the full optimum filter settings for the Intellivox used within your DDA model.

The beam setting is also produced for use within your Intellivox and can be uploaded via WinControl. In your project folder a **Your Project Name*_WinControl folder will be created which will contain a .DDA and .STK file, these files are used by WinControl to upload the beam to the Intellivox.

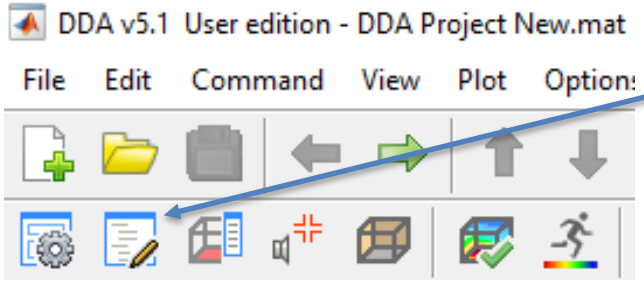
Once a Full Run has been completed you will also be able to access the following options.

Select loudspeakers to be used for Receivers

Check receiver Responses

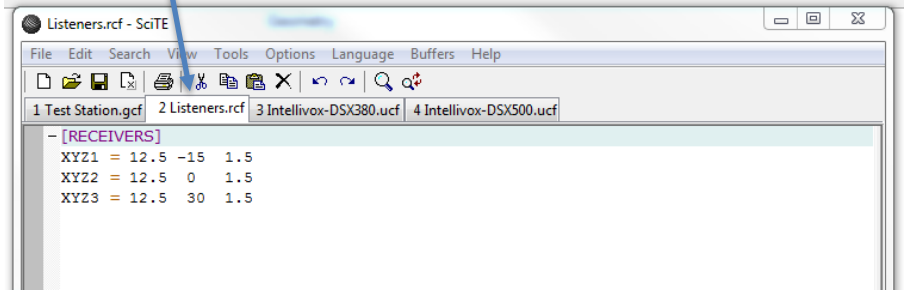
Map Response from the array using the full calculated FIR output filters, (similar to the trial run but uses the full calculated filters).

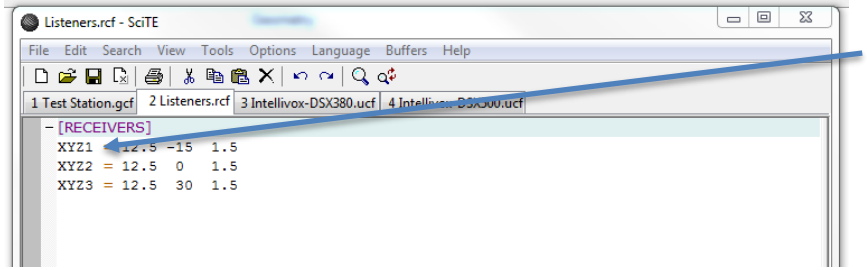
View output filters and amplifier headroom of each array



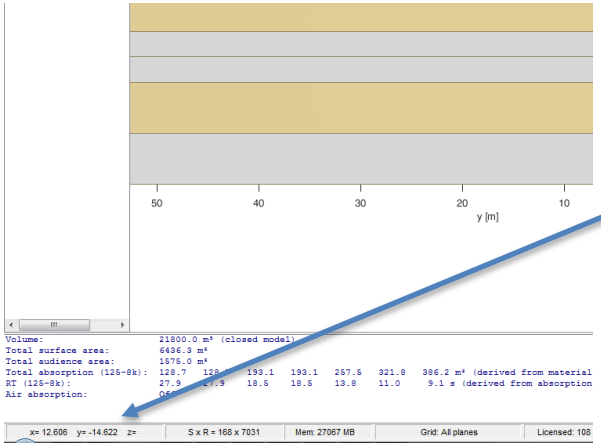

To look at receiver positions, if you click on 'edit configuration files'

a window will open, then click on the Listeners tab

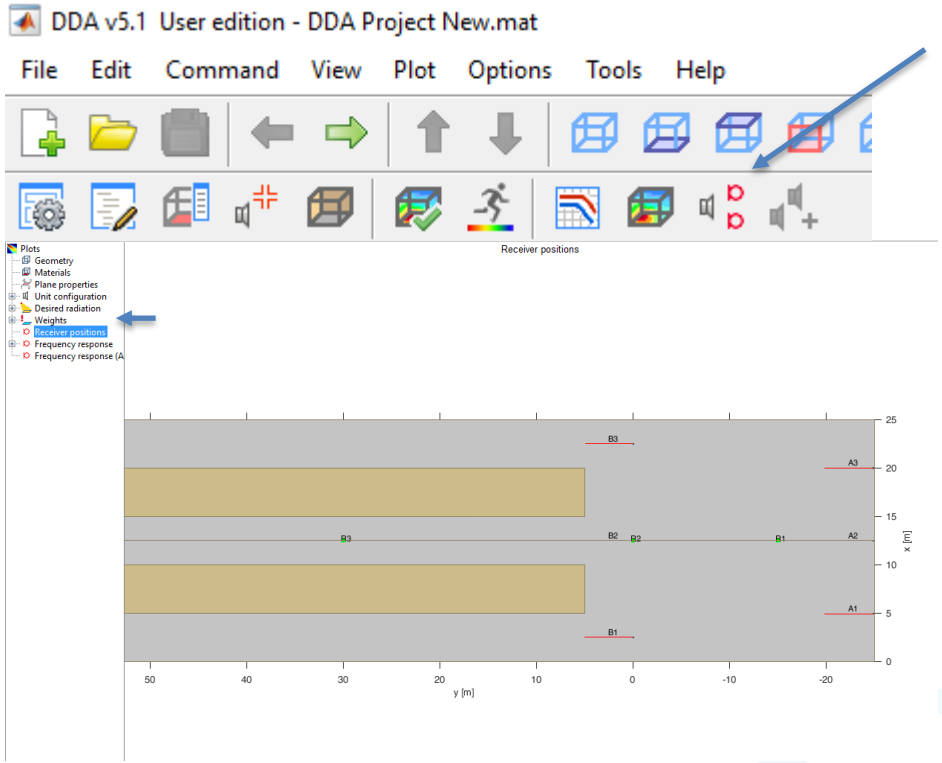




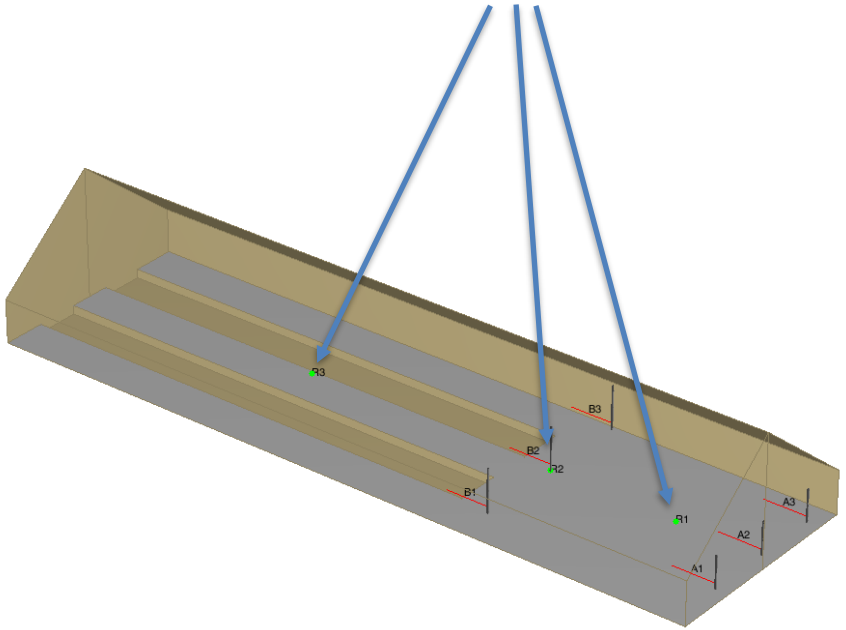

The reference XYZ1 refers to the first listener or receiver position, with the first number being the 'x' position, second 'y' and the last the height 'z', the coordinates should be separated by a space or a tab and be saved in the same format.



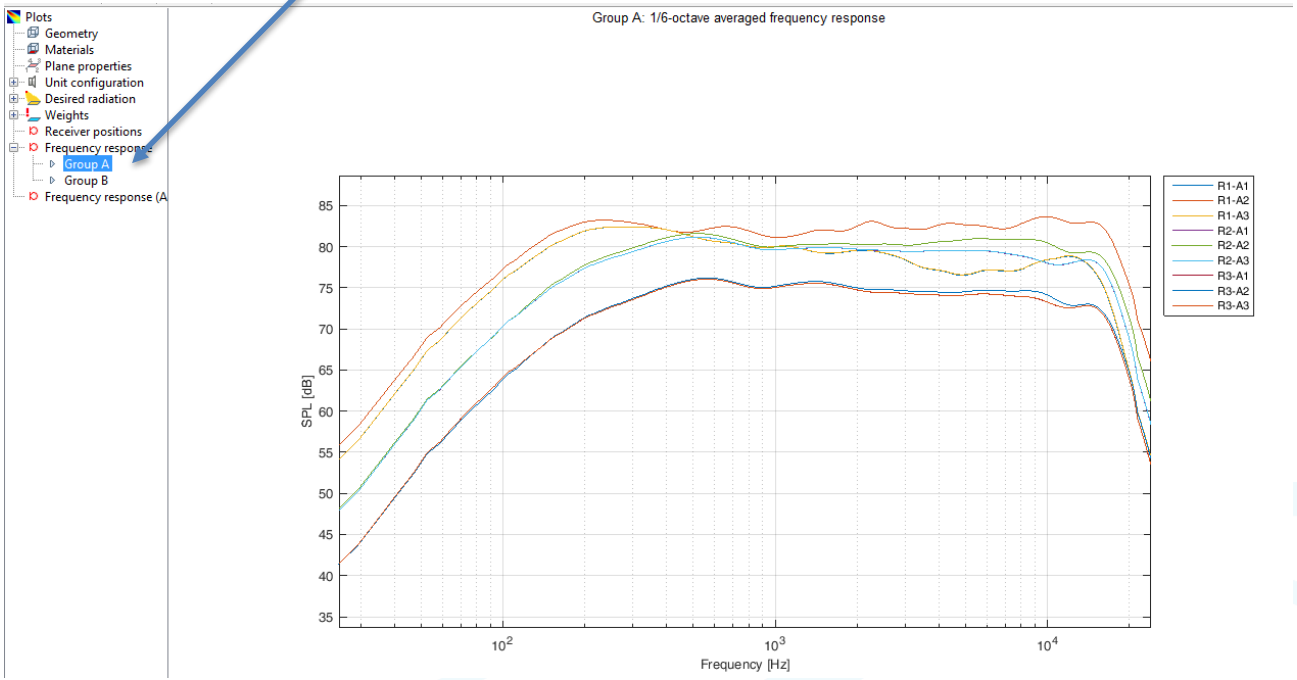

To identify an exact location on your model select geometry and click on XY projection view.
Then if you move your mouse over the model the mouse location XY parameters are identified in the lower left hand corner. Copy these coordinates into your XYZ positions to place your listeners and click on save when you have finished editing.

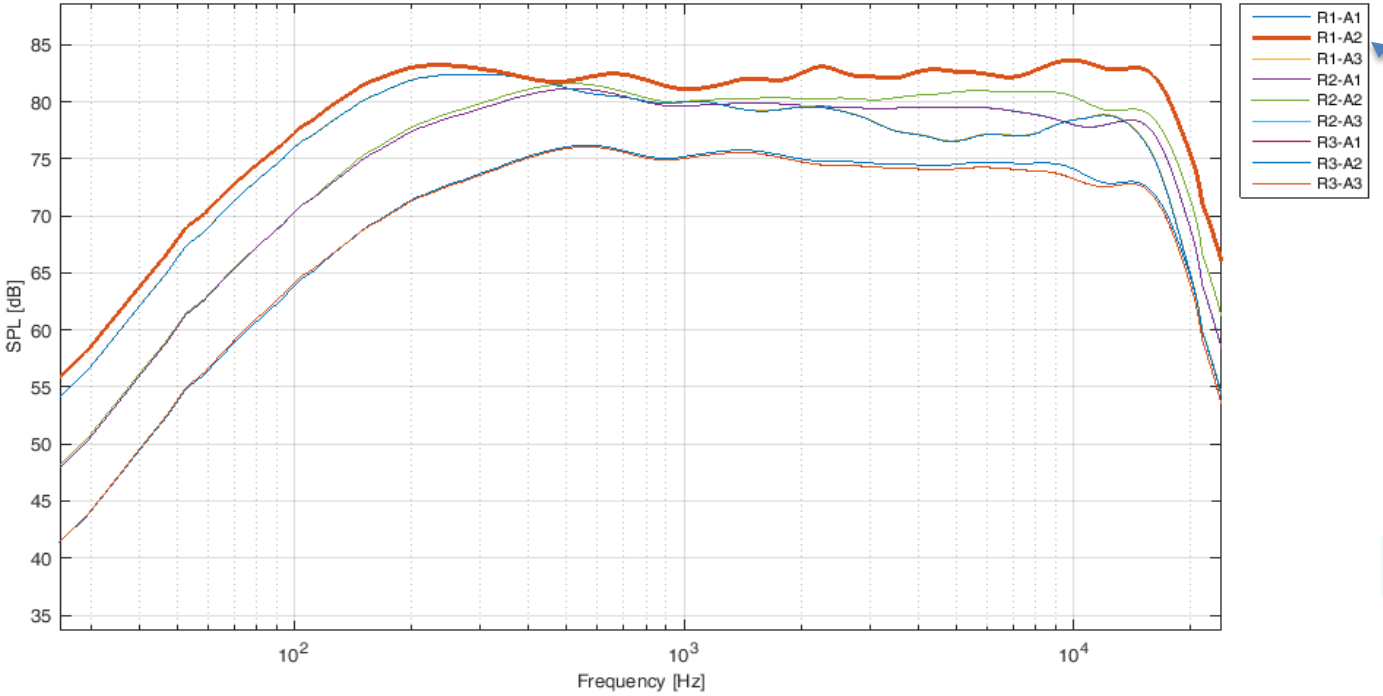



Click on 'Receiver response' and after a short calculation your receiver positions will be displayed on screen - R1, R2 and R3.

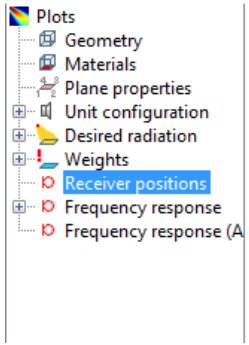


Clicking on ‘Frequency Response’ shows the responses for each of the Groups used within the model

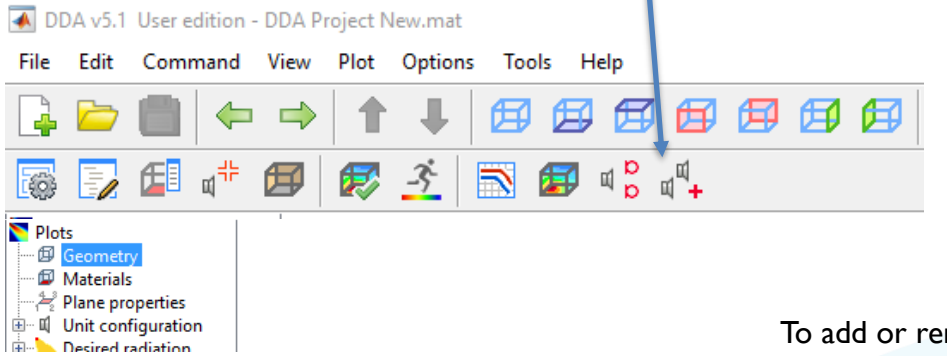


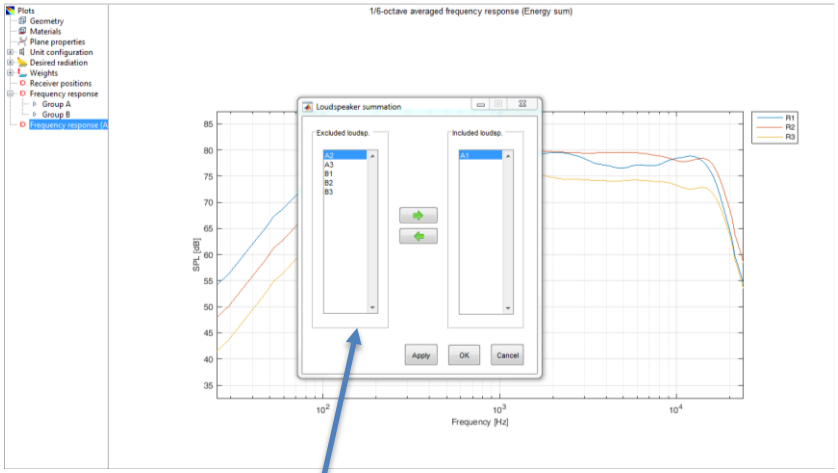



Click on receiver responses to highlight an individual curve.

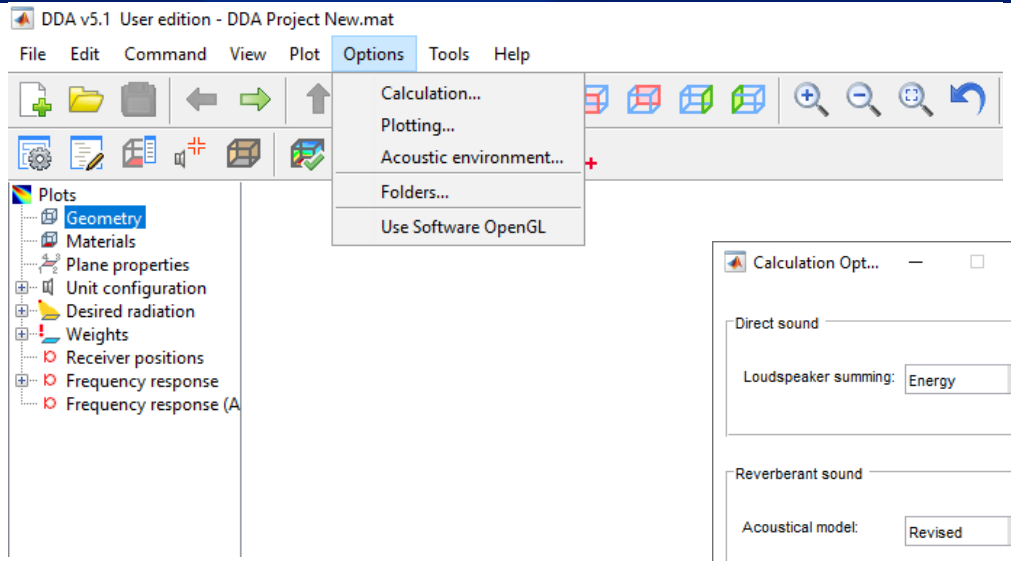



Frequency Response (array sum) gives 1/6 octave averaged frequency response for each receiver position, to choose which loudspeakers you want to include, click on 'Select loudspeakers for summation'




To add or remove loudspeakers from the graph click on the green arrows and click apply.

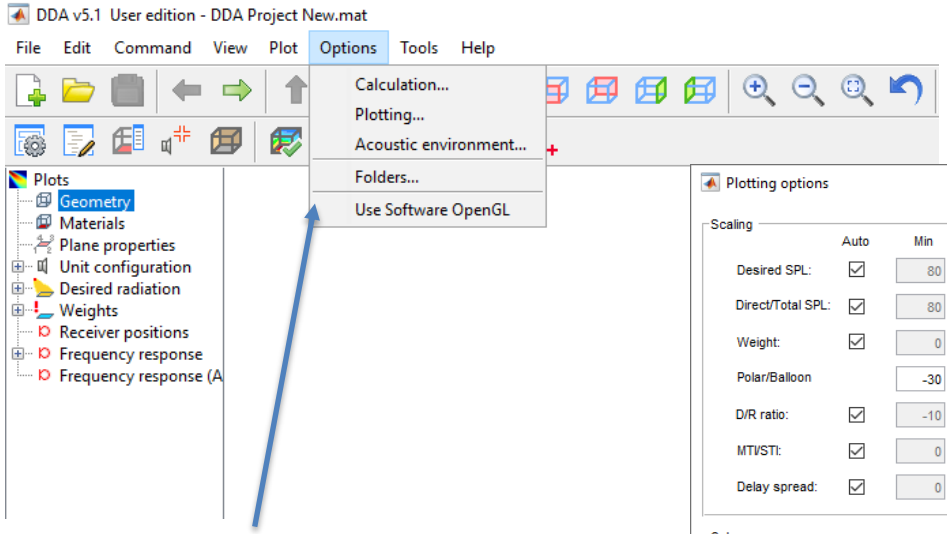



Options Menu Opens up the following in separate pop up Windows.

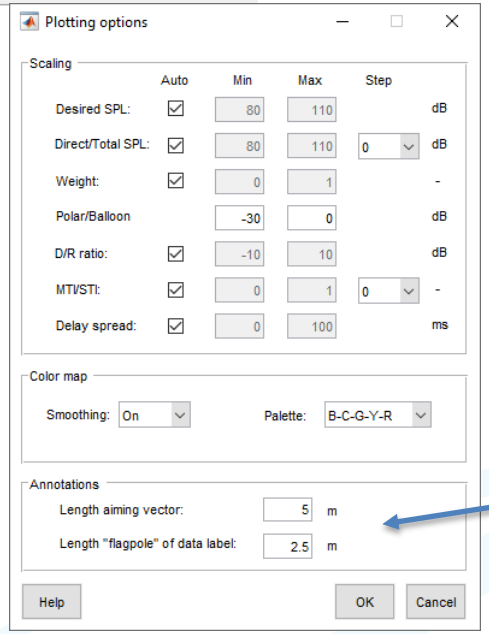



The Calculation option enables you to change the calculation from Energy sum to Interference Sum in Direct sound only.

Reverberant sound level is calculated statistically using either the Revised (Barron and Lee) or Classical (Beranek), See help file for further details.

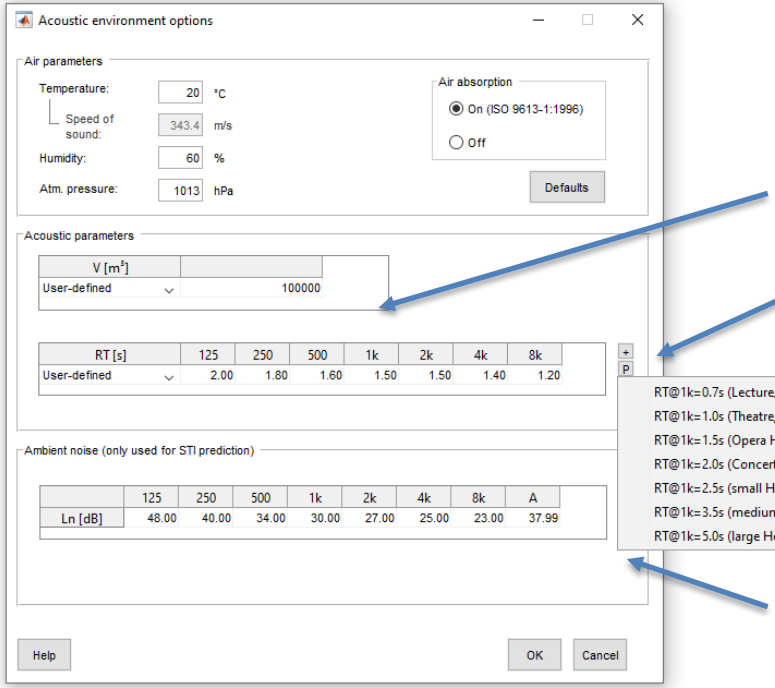



Folders option sets where the default folders for DDA are accessed.




Plotting Menu enables you to manually set the plotting scaling

Annotations enables you to change the aiming line from the acoustic centre of the loudspeaker and the 'flagpole' which is the length of the line coming from the spot frequency measurements.



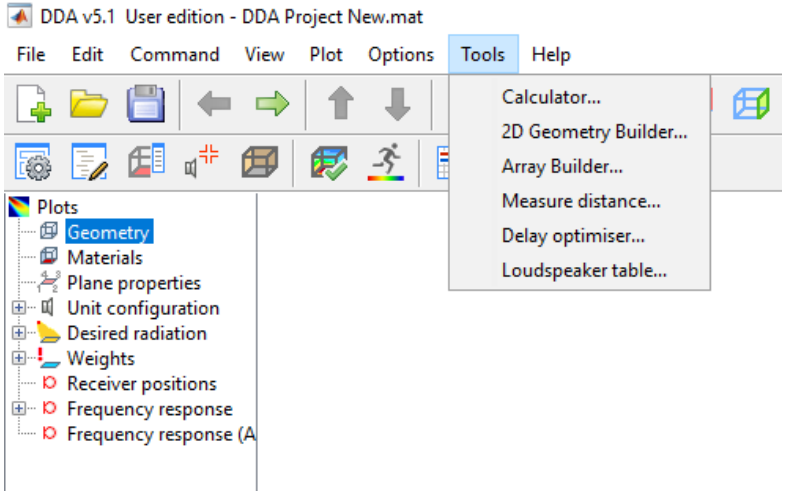

Acoustic environment – air parameters show the effects of air absorption and humidity on dispersion patterns.

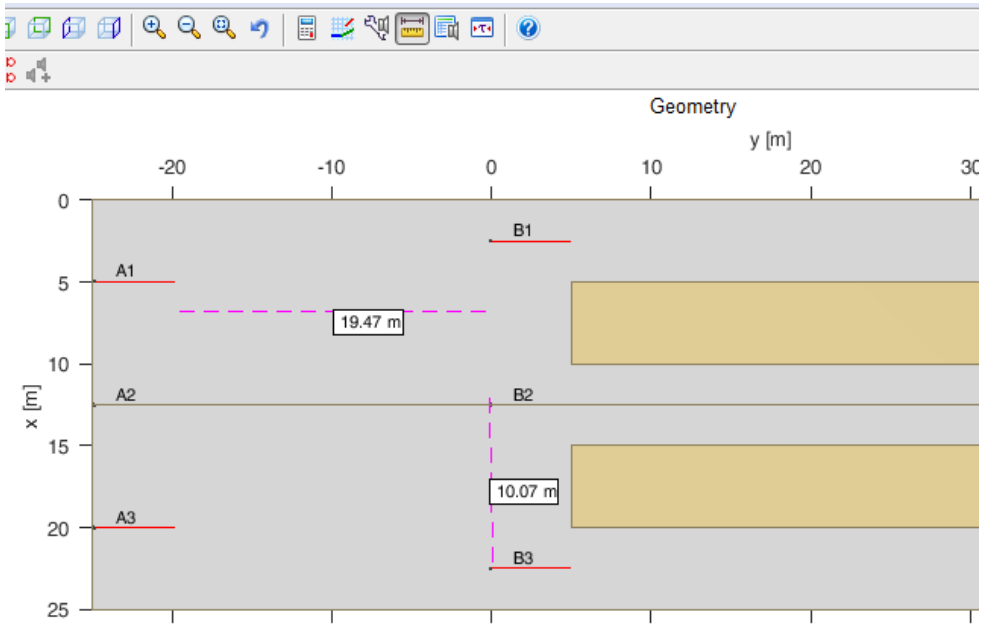
To calculate intelligibility with an 'open' model then you can manually enter the volume of the space in $m^3$, the reverberation time in octave bands and the background noise figures.

There are various 'library' reverberation times that can be used by clicking on P

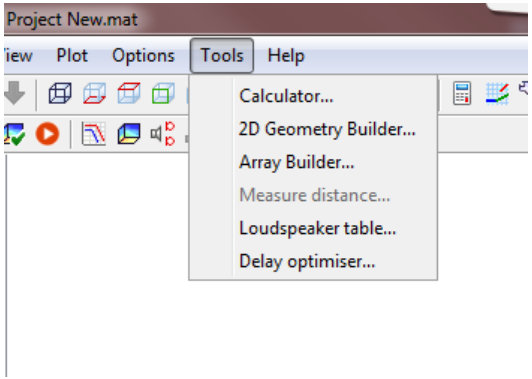
The + and – can be used to manually increase or decrease the reverberation time.

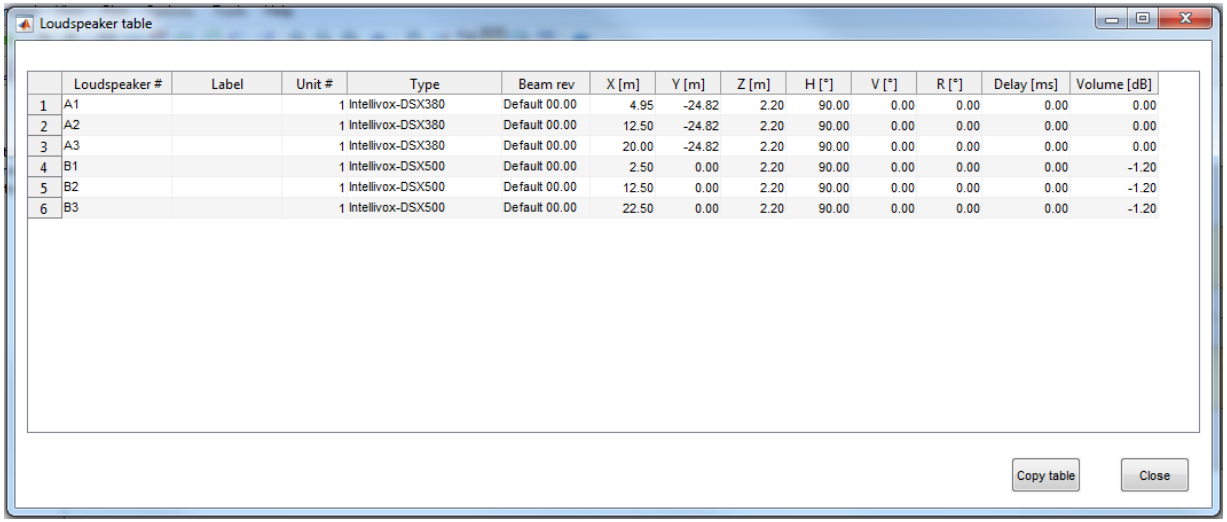
There are various NR curves available that can be used by clicking on P, ( the A-weighting value only indicates the overall level and is not used in the calculation) The + and – can be used to manually increase or decrease the background noise to see its effects on intelligibility.



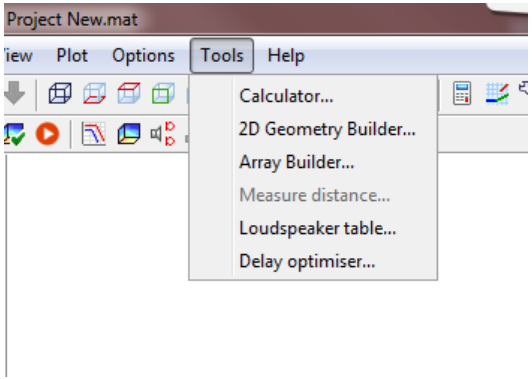

Measure distance works in 2d geometry view only - by clicking on a start position and an end position the measurements will be displayed on screen.

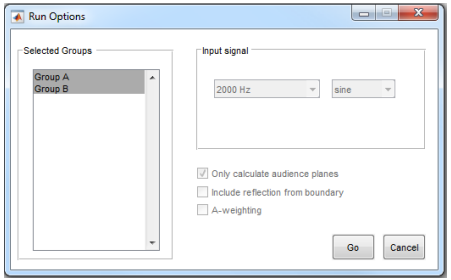


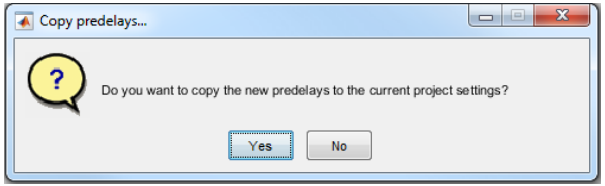



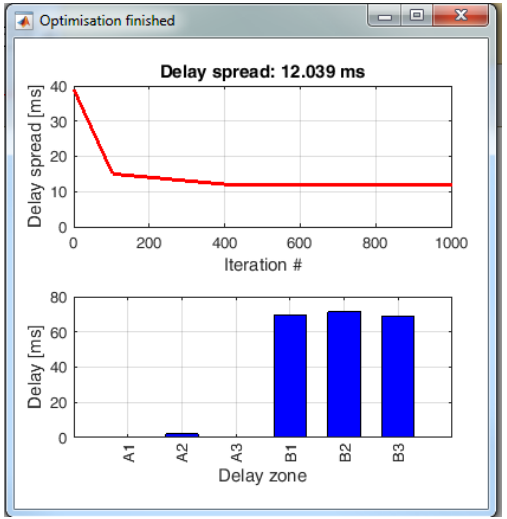

| | Loudspeaker # | Label | Unit # | Type | Beam rev | X [m] | Y [m] | Z [m] | H [°] | V [°] | R [°] | Delay [ms] | Volume [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A1 | | 1 | Intellivox-DSX380 | Default 00.00 | 4.95 | -24.82 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | A2 | | 1 | Intellivox-DSX380 | Default 00.00 | 12.50 | -24.82 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | A3 | | 1 | Intellivox-DSX380 | Default 00.00 | 20.00 | -24.82 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | B1 | | 1 | Intellivox-DSX500 | Default 00.00 | 2.50 | 0.00 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | -1.20 |
| 5 | B2 | | 1 | Intellivox-DSX500 | Default 00.00 | 12.50 | 0.00 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | -1.20 |
| 6 | B3 | | 1 | Intellivox-DSX500 | Default 00.00 | 22.50 | 0.00 | 2.20 | 90.00 | 0.00 | 0.00 | 0.00 | -1.20 |

Loudspeaker Table displays all loudspeakers used within the DDA model and various other information.

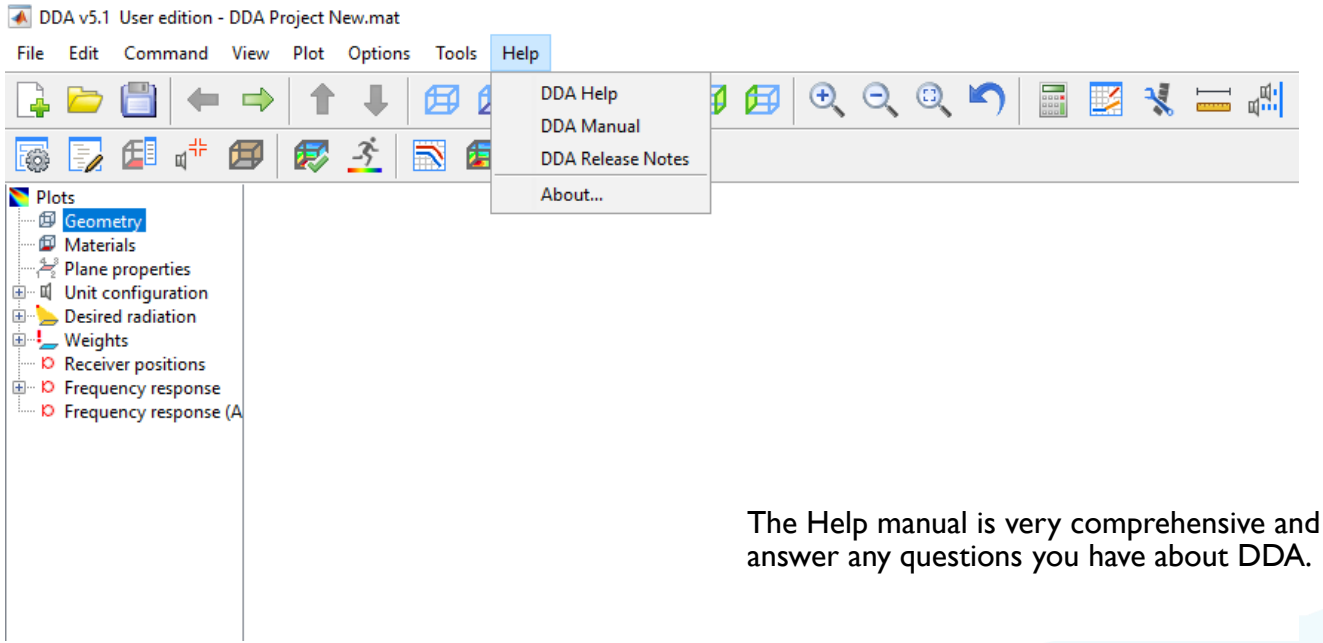



Delay optimiser is used to calculate the optimum delay between loudspeakers taking into account the rear radiated energy.




The Help manual is very comprehensive and should answer any questions you have about DDA.

The About option details the version of DDA that is currently installed.