



Acoustical modeling of internal spaces optimises speech intelligibility and music appreciation for audiences

We now have computer modeling software that can be used in the design of any type of internal space such as halls, lecture theatres and rooms used for music or speech. The modeling is 3 dimensional and produces colour maps of sound intensity qualities in the room.

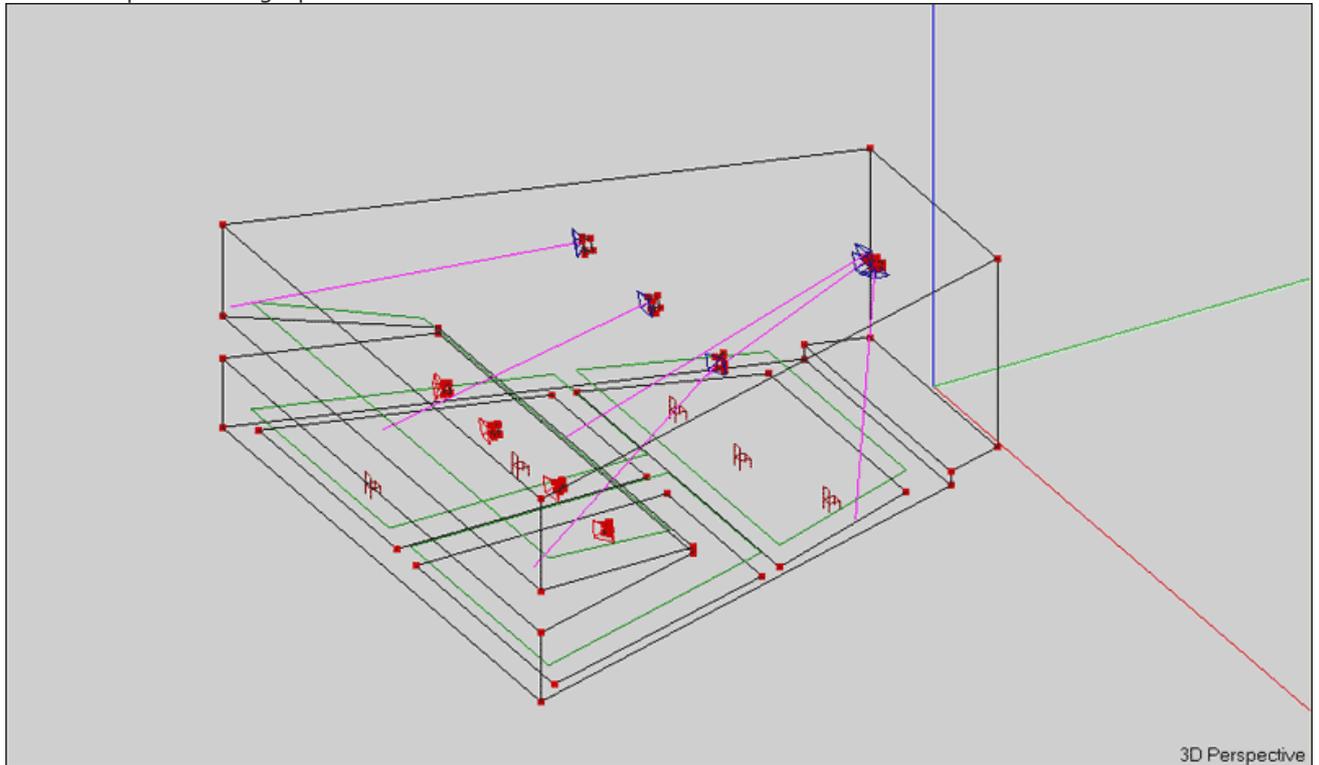
To start, we define the shape of the hall including any features such as balconies and the types of surfaces and their sound absorbency. The location, direction and type of audio speakers can then be described. The audience is also included in the model.

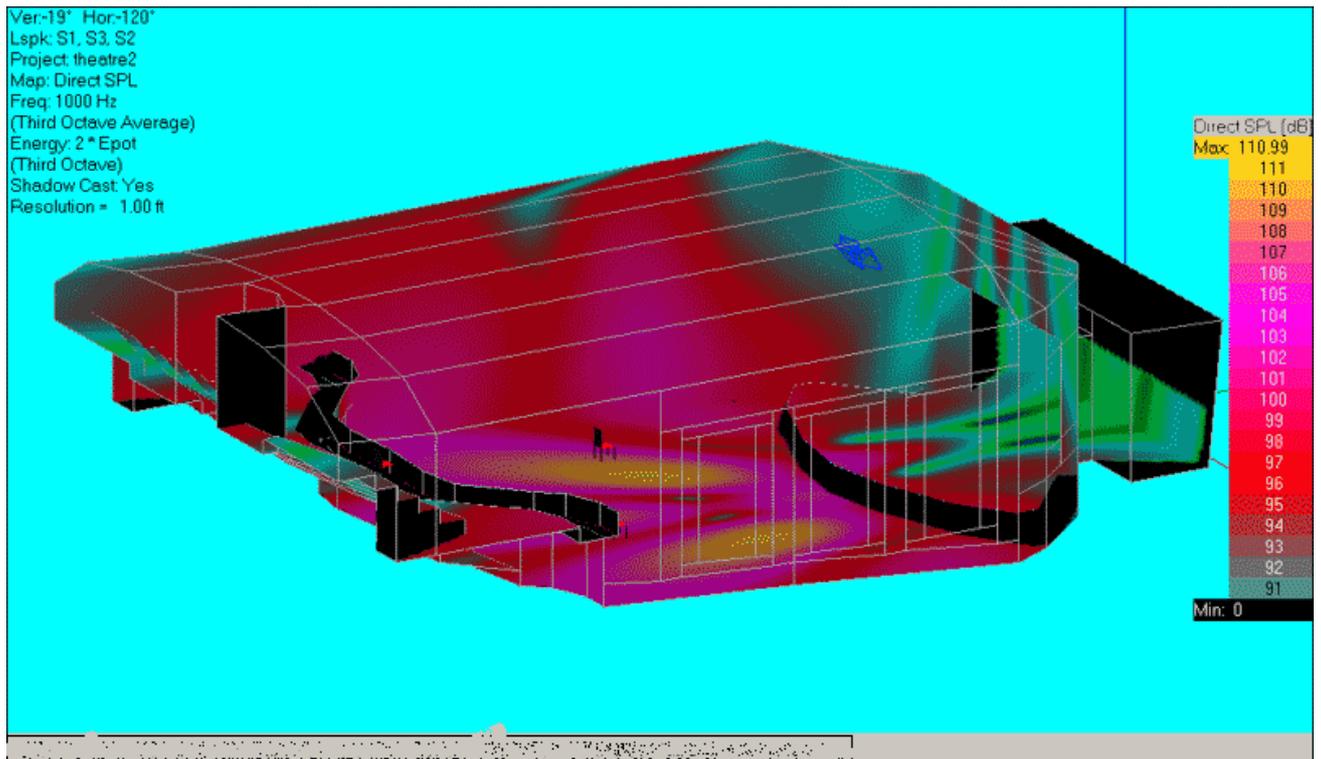
Once the room is defined, the program is run to produce 3 dimensional colour displays of the room showing the sound intensity at locations such as the audience area.

The benefits of the modeling are that various sound indices can be produce including sound pressure level and articulation qualities which allow us to optimize the shape, the physical features, absorbency of room surfaces and the type, location and direction of audio speakers. In this way, we can maximize the acoustical properties of the room to ensure that both speech and music audibility and qualities are optimized for all audience locations.

We have just been involved in a project that modeled speech in a tunnel to ensure that people could understand emergency evacuation instructions. We used the modeling software as a means of identifying locations where intelligibility might be low. We then could optimise speaker numbers, location, direction and other qualities.

Two examples of the graphics are shown.





Building Code of Australia and wall and floor design for noise

Changes to the BCA (Building Code of Australia) now require at a minimum, either new deemed to satisfy (DTS) wall and floor construction types or equivalents. To ensure that walls and floors meet requirements, there is provision in the BCA to use an on site verification method, or construction types tested in a laboratory or provide some evidence or opinion.

Our experience is that DTS designs do not easily allow for services within walls and clients are looking for options that are more practical. We provide advice to architects and designers on options for walls and floors including the new range of construction types that have been tested by manufacturers. We can also carry out verification testing of walls and floors.

Environmental noise assessment and modeling

We have just completed a freeway noise assessment using SoundPlan. One particular aspect of the project we looked at (because of community concern) was the reflection of noise off the traffic side of the barrier to other houses across the freeway. We produced a range of colour noise contour maps for the study area including one showing the noise level difference before and after construction due to barrier reflection.

For another project, we prepared an environmental noise impact statement for a sand mining operation which involved modeling noise sources and an ambient noise survey over a large study area. The study examined noise from all sources including dredging, pumping of slurry and road traffic noise on and off the site. Noise maps were prepared for a range of operating scenarios. An example of a noise map is shown on our website - <http://www.environmentalresults.com.au/noisemapping.htm> .