

In the 1980s, RPG Diffusor Systems, Inc., founded by Peter D'Antonio, created and manufactured the first commercial sound diffusors with predictable performance, based on number theory. These new devices contributed to the creation of a new control room design in 1984, recognizing the importance of a spatial and temporal Reflection Free Zone (RFZ) surrounding the mix position and a Diffuse Field Zone (DFZ) following the arrival of the first diffuse reflections from the rear wall. The RFZ was created by adding broad bandwidth porous absorption to side walls and ceiling between the speakers and mix position, as well as creative geometric modifications when and where possible. The DFZ, which followed the RFZ, was created with Reflection Phase Grating (RPG) diffusors, which created a dense temporal reflection pattern to minimize rear specular reflections and create a sense of immersion or envelopment — essentially passive surround sound — and broaden the “sweet spot.” Several cutting - edge audio control room and critical listening room designers recognized these ideas and began integrating them into their thinking.

Peter's research extended the RFZ/DFZ design concepts below the transition frequency (Schroder frequency) from geometrical acoustics to wave acoustics, in 2000 by developing two iterative image model programs called the Room Sizer and Room Optimizer. These would eventually become NIRO's predecessors and great programs, but they are limited to cuboid rooms. For this special case of cuboid rooms, the image model is a perfect solution to the wave equation, considering all the walls as fully reflective. These programs quickly and iteratively optimize the dimensional ratios and positions of loudspeakers and listeners by minimizing the standard deviation of the modal response and SBIR in a cuboid room. With these novel programs, it was now possible to address all four forms of Acoustic Distortion, the RFZ

and DFZ above the Schroeder frequency; and modal resonances and the SBIR below.