

DiffuseReflections

The Newsletter for Progressive Acoustics Research

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RPG's new hinged VariScreen™ is a versatile upholstered panel that offers absorption on one side and BAD™ diffusion on the other.

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For up to the minute information, we invite you to visit RPG's new web site:
<http://www.rpginc.com>.

DIFFUSE NEWS



Dr. Peter D'Antonio
President and CEO

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DTS has selected RPG® products for their critical listening environments, as well as their trade show exhibits to demonstrate the sonic benefits of their technology. Tom Jung is using RPG® technology at DMP to critically evaluate his pioneering DTS and DSD recordings. Jack Renner and Michael Bishop at Telarc have used RPG® technology for the past 12 years to create their award winning recordings. Bob Ludwig at Gateway Mastering Studios is using RPG® in his critically acclaimed 96 kHz/24 bit mastering room. Gateway has also chosen our Skyline® and BAD™ panels in their new DVD home theater studio.

We collaborated with Professor Chris Kyriakakis and Tom Holman in the application of RPG® products in their multi-channel music Immersive Audio Laboratory within the USC Integrated Media Systems Center. Sean Olive and Floyd Toole are using Skylines® and the Room Optimizer™ in Harman International's Multichannel Listening Laboratory to evaluate the psychoacoustical effects of listener and loudspeaker placement.

Sony and RPG's collaboration began in 1986 with David Smith at Sony Classical, before the move to Sony Music's 54th Street facility. At Sony Classical, the temporary

edit suite was outfitted with an RPG® Diffusor System of Abffusors®, Diffusors®, and Bass Traps. The relationship continued at Sony Music, where most of the recording, mastering, and production rooms incorporate RPG® products. Thanks also to Al Smith of Sony Music for this level of commitment to our products.

Tom Jung of DMP and David Kawakami of Sony Electronics Hi-Fi Division selected RPG® to acoustically design and treat the Sony demonstration room at Hi-Fi '98 in Los Angeles. They used our new VariScreen™, which is a self-supporting hinged panel with an absorptive side and a BAD™ diffusive side. The VariScreens™ quickly converted the hotel room into a credible presentation venue for Sony's new Super Audio Compact Disc (SACD). The SACD format has been created by Sony Corporation and Philips Electronics to provide unprecedented two-channel and multi-channel sound. It employs Direct Stream Digital, a one-bit recording technology that samples the musical signal at the phenomenal rate of more than 2.82 MHz per second (64 x 44.1 kHz). As a result, an extremely smooth digital waveform with an unparalleled frequency response of DC - 100,000 Hz is achieved, with a dynamic range of more than 120 dB. Presentations were made by Telarc president Robert Woods and engineer Michael Bishop; Tom Jung, President of DMP; and Lori Beaudoin, President/GM of Modile Fidelity about their experiences with this new and exciting technology.

RPG® is committed to developing the acoustical standards for the next generation of multichannel music and home theater surround sound formats, as it did for stereo in the early 1980s. We are also forming strategic alliances with the industry's leading home theater designers and system integrators to bring this leading-edge acoustical technology into residential spaces.





Research & Development

STAGE/AUDIENCE CANOPY

Figure 1 shows the canopy design for a new recital hall containing an array of twenty 6' x 14' sinusoidal shapes at various heights, forming an interesting elliptical bell-shaped pattern that covers both the stage and audience. As part of RPG®'s CHAOS™ program, we collaborated with the architect and acoustical consultant to optimize both the shape and tilt of each element, while maintaining the motif desired by the architect and client.

OPTIMIZATION PARAMETERS

In this example, the goal of the optimization was to achieve uniform coverage at all receiver positions from all sources over a frequency range of 100-3,000 Hz. The maximum allowable depth was 2'. The Shape Optimizer™ was used to determine the shape and also the tilt of the canopy elements with respect to the horizontal plane. Figure 2 illustrates the optimized shape and tilt of four of the twenty optimized canopy elements, the 10 source positions (solid diamonds) on stage, and the 50 receiver positions (open squares) in the audience and on stage. The sources and receivers on stage represent the musician's instruments and their ears, respectively.

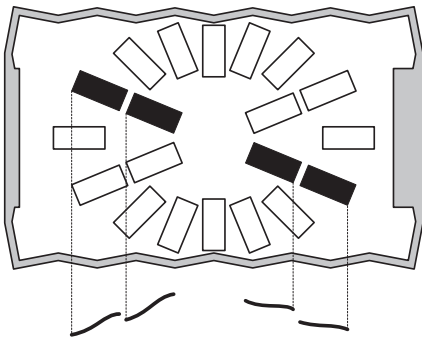


Figure 1. Reflected ceiling plan showing the 20 canopy elements. Four canopy elements, shown in black, are illustrated in section.

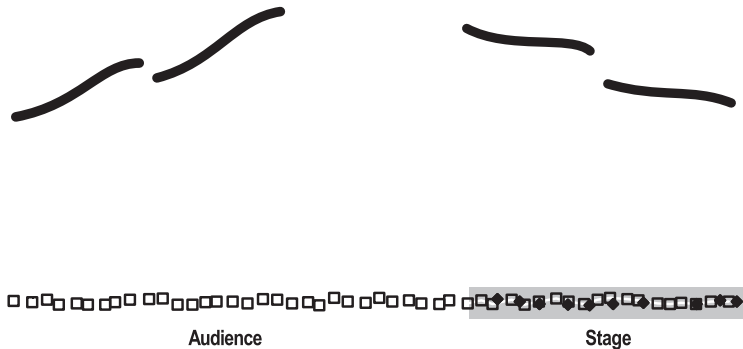


Figure 2. Four of the twenty canopy elements, the 10 sources lying on stage (black diamonds), and the 50 receivers (open squares) in both the audience and on stage are shown.

RESULTS

Notice that the stage canopy elements have less tilt to provide ensemble reflections to the musicians on stage as well as the fore-stage area. The rear canopy elements are tilted at a greater angle so that sound projected from the stage is scattered into the audience area.

Acousticians have used performance specifications to indicate desired objective parameters, such as reverberation time, based on the number of Sabines of absorption. The Shape Optimizer™ now makes it possible to quantify the degree of scattering as well, so that performance specifications can also contain diffusion criteria. This is a significant development for architectural acoustics and provides another step forward in predicting the performance of virtual spaces.

The performance of the canopy can be quantified by the random incidence diffusion parameter in dB. This parameter is determined by the average standard deviation of the 1/3-octave sound pressure level at all receiver positions from all sources over the frequency bandwidth of interest. Figure 3 compares the optimized performance with that of a flat canopy panel (Zero standard deviation indicates the desired scat-

tering coverage has been fully realized). The degree of scattering can be specified. In this example, uniform scattering was specified. Figure 3 illustrates

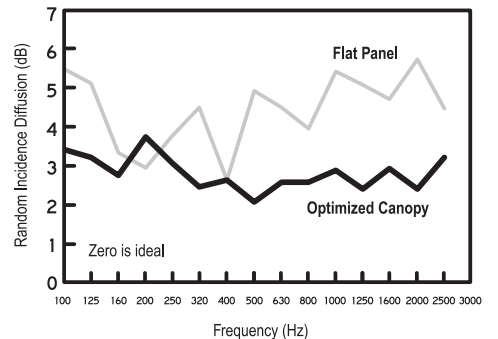


Figure 3. The random incidence diffusion parameter in dB for the optimized canopy is compared with a flat canopy.

how the random incidence diffusion parameter has been lowered significantly over the frequency band of interest, compared to a flat panel.

The Shape Optimizer™ produces a DXF file, which is used to create templates for either wood bending or fiber-reinforced gypsum fabrication. The CHAOS™ program allows RPG® to work with the design team by offering optimization only, materials only, or a fully rigged and installed canopy and acoustical shell system.





Diffuse Applications

CINEMUSIC II

Volume 4, Issue 1 of Diffuse Reflections introduced RPG's CineMusic System. This system addresses the aesthetic and budget requirements of residential home theaters. CineMusic I was also described.

While some enthusiasts prefer the high-tech appearance of CineMusic I, others choose to conceal a part or all of the acoustical products. One popular approach is RPG's CineMusic II, which uses a stretch fabric system called SoundTrac™. Figure 1 shows a rendered version of CineMusic II in which the Skyline® ceiling is exposed and all side and front wall acoustical products, indicated in Figure 2, are concealed. Because of the elegant appearance of the furniture-grade Diffractal®, many clients also prefer to leave this exposed as an acoustical sculpture.

Figure 2 illustrates the placement of the Abffusors®, Corner Bass Traps, Skylines®, FlutterFree®, Diffractals®, and RPG's new Bass Absorbing Soffit System™ (B.A.S.S.). The soffit is a very important ingredient in Home Theater design, because this location in the room is seldom used for any other purpose, except HVAC and down-lighting. RPG® offers

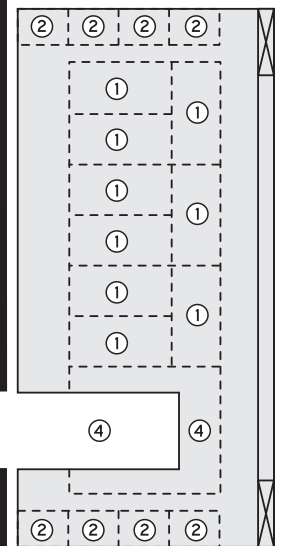
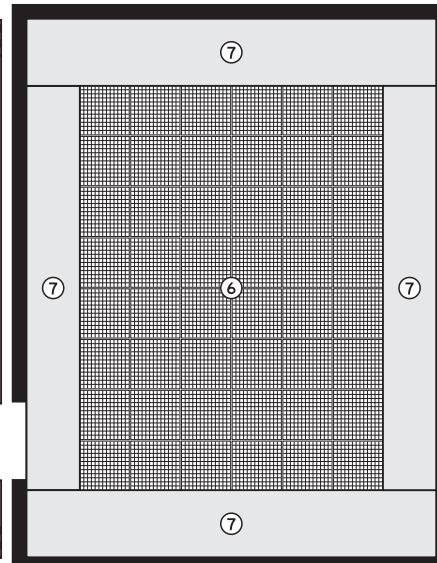
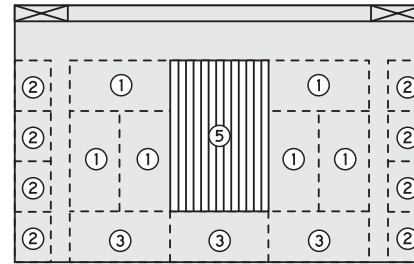
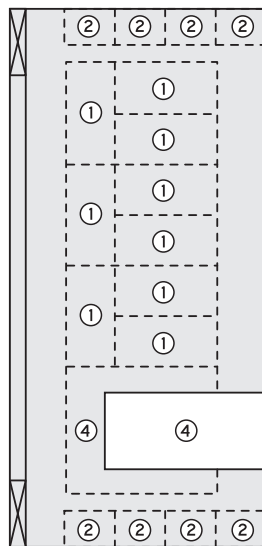


Figure 1. A rendering of CineMusic II illustrating how the Bass Absorbing Soffit System™ is used to frame a sculptured Skyline® ceiling. The fabric system is made transparent on the right front wall only to illustrate the concealed products.

① Abffusor®

② Corner Bass Trap

③ Wall Bass Trap



④ FlutterFree®

⑤ Diffractal®

⑥ 48 Skylines®

⑦ Bass Absorbing Soffit System™ (B.A.S.S.)

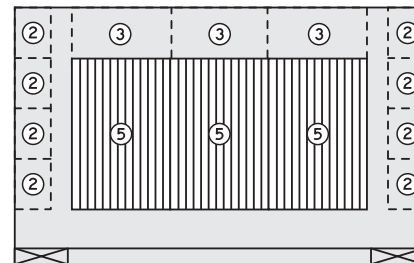


Figure 2. Plan and elevations for CineMusic II. In this illustration the Diffractals® and Skylines® are exposed, but all other acoustical products are concealed behind a stretch fabric system.

an upholstered B.A.S.S. or a new fiber-reinforced gypsum B.A.S.S., which can be taped and painted like drywall. The B.A.S.S. contains linear "L-shaped" soffit sections, inside and outside corners, for a very effective and easy to install system. In addition to

the CineMusic Systems, RPG® is working with system integrators, acoustical consultants, and dealers using our CHAOS™ program to create custom, optimized acoustical products that integrate the acoustics with the architecture.

Project Profile: Jubilee Christian Center



ARCHITECT

"It is a pleasure to write this letter extolling the virtues of Omnifusors™. Jubilee Christian Center needed to seat in excess of 3,000 persons. Because of City of San Jose requirements, the overall height of the building was thirty seven feet. Therefore, the ratio of volume per person was very low. We used Omnifusors™ on the ceiling to enhance the natural acoustics of the room. The results were very satisfactory both acoustically and aesthetically. We can recommend this product without hesitation."

David Austin Smith, Architect, San Ramon, CA

ACOUSTICAL CONSULTANT

"The acoustical design for Jubilee Christian Center's new 3,200 seat auditorium proved to be an unexpected challenge. The City of San Jose, California imposed a height restriction late in the design that resulted in an inadequate ceiling height and reduced room volume that threatened our charge to provide an acoustical environment conducive to congregational singing. We proposed to solve this problem by embedding RPG® Omnifusors™ in quantities to approximate a 50% fill of the ceiling area. The church approved this design and we are all now very pleased with the results from both an acoustical and architectural perspective."

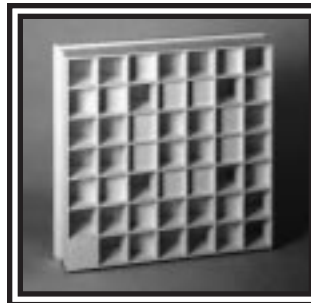
Michael R. Garrison, Michael Garrison Associates (MGA), Fresno, CA

CLIENT

"We were a little concerned when the RPG® Omnifusors™ were initially proposed to us, as we had never seen such an unusual looking ceiling panel. However, since MGA told us this would be the best solution for our dilemma, and since we were able to fit it in the budget, we decided to give it a "go". We don't know how these things work, but the acoustics in our new auditorium are wonderful! And nearly everyone who comes into our church for the first time comments on what a "neat" ceiling we have."

Richard W. Taylor, Executive Director of Jubilee Christian Center, San Jose, CA

PRODUCT



Omnifusor™

