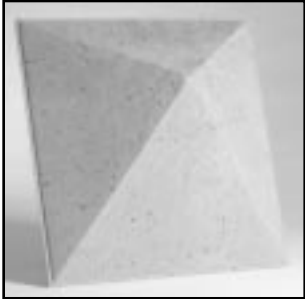


DiffuseReflections

The Newsletter for Progressive Acoustics Research

Volume 4, Issue 1, 1998



Introducing the Golden Pyramid™:
A compression molded, painted
abfusing fiberglass pyramid

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Corning Glass 2000

"RPG is continuing to push the acoustical envelope with CHAOS™ and other innovative optimization and auralization software, but we are now also systematically trying to acoustically enhance and evolve traditional products like the fabric wrapped panel, the pyramid, convex arc, drapery, perforated panels and the Helmholtz absorber."

DIFFUSE NEWS CELEBRATING OUR 15TH ANNIVERSARY!



Dr. Peter D'Antonio
President/CEO

I want to take this opportunity to thank the acoustical consulting community for the wonderful support and encouragement you have given me and the trust you have placed in RPG. You are important to us and we are striving to provide you with an ever expanding palette of AcousticTools®. We have increased our architectural representation in many areas to provide consultants with a local presence. If you do not know who your RPG rep is, it shouldn't be long before he is soaking up your billable hours. RPG is continuing to push the acoustical envelope with CHAOS™ and other innovative optimization and auralization software, but we are now also systematically trying to acoustically enhance and evolve traditional products, like the fabric wrapped panel, the pyramid, convex arc, drapery, perforated panels and the Helmholtz absorber. Our new compression molded Golden Pyramid™ is based on the aesthetically pleasing golden mean and comes in matching absorptive and diffusive versions. We also morphed the fabric wrapped panel into a turbo-charged Binary Amplitude Diffuser™. When you think of specifying a fabric wrapped panel, it will be 2 BAD™ if you don't consider the benefits and economy of the Binary Amplitude Diffuser™. In an effort to provide product brochures in a timely manner, we have taken all graphic design in-house, using Quark Xpress. Consultants should be receiving printed information and samples on a regular basis.

NEW PRODUCTS

GOLDEN PYRAMID™

The pyramid continues to be a popular geometrical shape. To introduce a bit of mathematics and aesthetics,

we have developed an asymmetrical pyramid based on the golden mean, which occurs in almost every aspect of our lives. To expand the palette of uses, we compression mold the pyramid out of fiberglass at two densities. For absorbing applications, we apply a non-bridging flec paint finish to a 7 pcf molded pyramid. For diffusing applications, we apply a resin/paint finish to a 21 pcf molded pyramid. This approach offers color coordinated, matching absorptive and diffusive panels at the lowest cost in the industry.

BAD™

We knew consultants were looking for an alternative to the conventional fabric wrapped panel, but we never expected this level of interest and excitement! The test data are equally exciting. Scattered sound above 1kHz is uniformly distributed by the binary amplitude grating surface and energy below that frequency is absorbed. This means we can offer a flat Diffuser™, which provides low/mid frequency absorption and high frequency diffusion. The BAD™ panel is available as an upholstered panel or as a core material for stretch fabric systems.

ROOM OPTIMIZER™ NOW SHIPPING

We are very excited about RPG's first software release called the Room Optimizer™. It seems like this is one of those AcousticTools® consultants have been wanting for years. Comments and orders at the Los Angeles NAMM show were very gratifying. The program contains room configuration wizards for stereo and the various 5.1 multi-channel music and home theater formats and can handle any loudspeaker type. Simply input the room dimensions, loudspeaker information, search limits and the program automatically determines the best positions for listener and loudspeakers that produce the flattest room response. An upgrade path from rectangular rooms to any shape room is planned, including auralization.



Research & Development

STAGE CANOPY STUDY-AUDIENCE

In Vol. 3, Issue 3 we compared conventional geometrical canopy shapes with an optimized curved surface. We showed how optimization can be used to design better stage canopies and compare several potential options for a particular project. The results indicated that optimized shapes can offer an improved performance over conventional periodic arcs, wedges and flat panels. In this second installment we show how optimization can also be used to control the ratio of scattered energy between the stage and the front section of the audience.

The canopy in Figure 1 consists of an array of similar, spaced, optimized shape elements. Each canopy element can be individually tilted for optimum coverage on stage and to produce the desired distribution of stage-generated energy between stage and audience. The canopy elements extend across the full width of the stage and are spaced for lighting or to access the volume above the canopy.

OPTIMIZATION PARAMETERS

In this optimization we specified that the scattered energy should be as uniform as possible on stage (-9 - 0 m) and in the audience area between 4 and 10 m from the edge of the stage. In addition, we searched for the best shape and orientation to reduce the level in the audience by 3 dB of what it is on stage. To accomplish this, the Shape Optimizer™ varies the shape and tilt of the 5 individual canopy elements. At each iteration of the optimization, the standard deviation of the scattered pressure, indicated in Figure 2 for a source at the rear of the stage and at 1 KHz, is monitored as an indicator of performance. The Shape Optimizer™ cycles until it finds the best shape

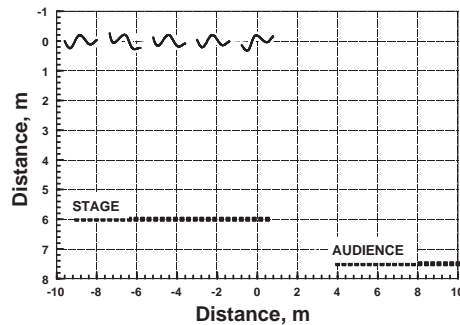


Fig 1. Configuration of shaped and tilted stage canopy elements.

and tilts that yield the lowest standard deviation in the specified bandwidth (i.e. 100 to 3,000 Hz) at all observer positions, from all source positions.

RESULTS

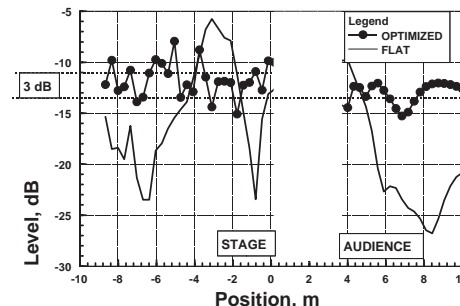


Fig 2. Comparison of the sound pressure level on stage and in the audience at 1 kHz, for a source at the rear of the stage, for a flat and optimized canopy.

In Figure 2 we show the scattered sound pressure at 1 kHz from a flat canopy (thin line) versus an optimized canopy (thick line-circle). The flat canopy exhibits significant fluctuations both on stage and in the audience area of interest. The optimized canopy, on the other hand, displays a more uniform response. Since we need to evaluate the uniformity of the scattered pressure at 1/3-octave intervals over the band-

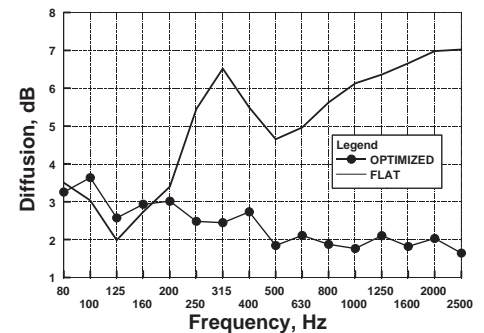


Fig 3. Comparison between the diffusion coefficient of a flat versus an optimized canopy.

width of interest at all receivers from all sources, we must find a way to condense this information. The diffusion spectrum accomplishes this in graphic form. The diffusion coefficient in dB at each 1/3-octave frequency band is the average standard deviation of the scattered sound pressure level at all of the receivers from all sources. A value of zero represents uniform scattering with zero deviations from the mean. Fig. 3 illustrates how the optimized canopy displays significantly better performance than the flat panel over the bandwidth of interest.

In conclusion, we have tried to show that the Shape Optimizer™ can provide consultants with a powerful new AcousticTool® to design optimum surface shapes, which comply with architectural motif and dimensional constraints, while providing the desired scattering coverage. Once the shape is optimized, it can be incorporated into RayNoise® (a powerful geometrical room simulation/auralization program from LMS that RPG is distributing) to allow auralization of the shape in the room, before it is built. RPG's expanded woodworking or fiber-reinforced gypsum manufacturing capability and painting facility, can make the design a reality.

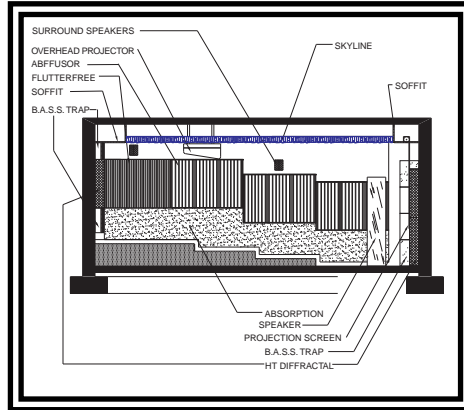




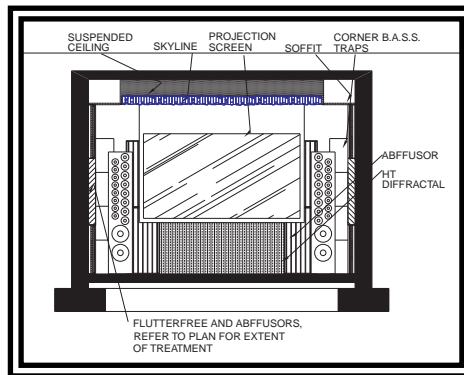
Diffuse Applications

HOME THEATER- CINEMUSIC I

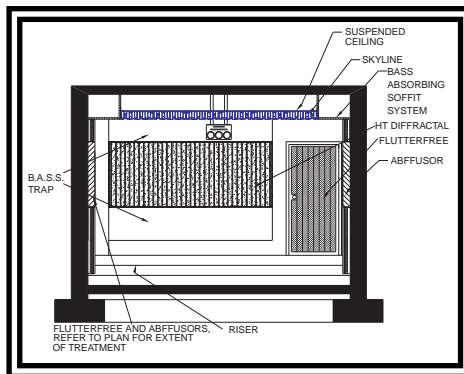
One of the fastest growing markets for acousticians is home theater. However, the advent of 5.1 discrete digital surround formats raises many new design issues that RPG is researching. Choosing room dimensions is a good way to start the design. 1 : 1.6 : 2.3 works well for a home theater. The next step is to optimize the acoustical coupling of the listener and loudspeakers with the room's modal pressure distribution and speaker-boundary interference response (SBIR). RPG's new Room Optimizer™ software is the first multi-dimensional optimization tool that automatically determines the best locations for listener and loudspeakers. The program simultaneously minimizes the SBIR and modal emphasis to produce the flattest room response. To simplify the room design, RPG has developed 5 new cinema & music turnkey systems called the CineMusic™ System. CineMusic I, shown at right, is intended for those clients interested in a "high tech" appearance in which all acoustical products are exposed. CineMusic II, attempts to conceal some or all of the acoustical elements with RPG's stretch fabric system called SoundTrac™. CineMusic III offers another approach to conceal some or all of the acoustical elements, using a traditional raised-panel hardwood system. Removable, upholstered panels are used to conceal the acoustical elements, wiring and hardware. CineMusic IV is a low cost complete room system using fabric wrapped absorbing panels, binary amplitude diffuser panels, bass absorbing panels and a Bass Absorbing Soffit System. All acoustics are concealed and field installation is fast and easy. CineMusic V consists of 1" or 2" absorbing or diffusing panels, with hardwood frames and high end fabrics. This system is intended for rooms where aesthetics is of primary importance and acoustical treatment can only be applied sparingly in strategic areas.



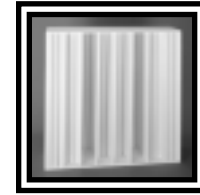
East/West Elevation



North Elevation



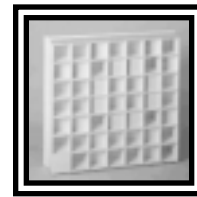
South Elevation



Diffractal®



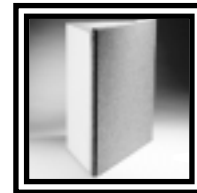
Skyline®



FRG Omniffusor™



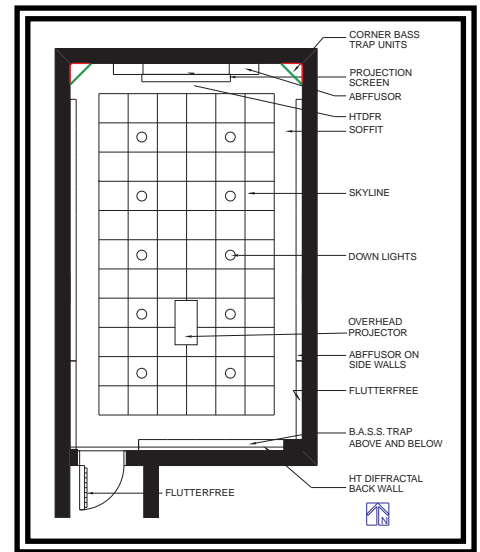
Flutterfree®



Corner Bass Trap



Abffusor®



Reflected Ceiling Plan

Project Profile: Corning Glass Center 2000



Full View of the VAMPS® orchestra shell and fully rigged overhead canopy.



Closeup view of the rollable side VAMPS® towers and side wall of the auditorium.

ARCHITECT

Henry Smith-Miller of Smith-Miller + Hawkinson Architects- "Corning's new 800 seat theater replaces Wallace Harrison's 1950's-era multi-purpose gymnasium and theater, once part of his visionary Glass Center in Corning, New York. The plywood-paneled proscenium arch together with plywood acoustic "towers" and stage back wall offer acoustical reinforcement and a backdrop for performance. The design suggests a certain lightness of being found in the creative act."

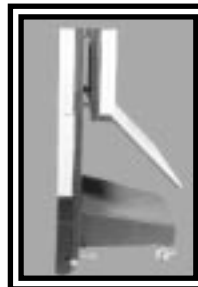
CONSULTANT

Francis Daniel of Shen Milsom & Wilke- "The RPG VAMPS® consists of 6 fully mobile towers, a canopy array consisting of 3 independently adjustable rows and a fixed rear wall. This degree of flexibility allows this multipurpose space to acoustically match the needs of everything from a small jazz group to a full symphony orchestra. The early reviews from a great variety of performers have been uniformly very enthusiastic. The owner and architect are equally pleased by the aesthetic values."

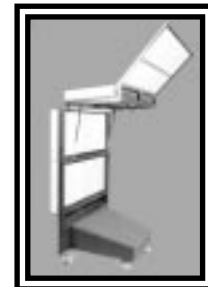
CLIENT

Albert L. Wright, Corning's corporate architect, provided the following testimonials from two performers at the hall. Nancy Wilson indicated that "the sound of the hall was excellent, one of the best she has experienced. This was the first hall she has ever performed in where the concert sounded exactly as it did during rehearsal and she could hear herself on the stage beautifully". The 25 string Irish Chamber Orchestra indicated that "the hall was very beautiful and that they loved their sound in the space. They could also hear each other, which they typically don't experience and found a bit unusual."

PRODUCTS



VAMPS® closed



VAMPS® mid position



VAMPS® upright

