



### SIAP MkIV Processor

In the first quarter of 2007, RPG will offer free design and tuning training for its newly installed SIAP Mk IV Processor system. Call to sign up.

#### IN THIS ISSUE

##### 1. Diffuse News

Follow The Leader  
Waveform for Walls & Ceilings

##### 2. Research & Development

RPG Expands the Shape Optimizer

"RPG has evolved the venerable QRD into the patented Modulated Optimized Diffusor or MODffusor and MODfractal, we have evolved the venerable FlutterFree into the patented FlutterFree-T, with significant increase in performance, we are evolving the BAD panel into a hybrid Ternary diffisorbor, with significantly better performance."

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

### DIFFUSE NEWS



Dr. Peter D'Antonio  
President and CEO

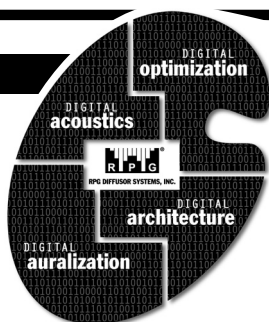
#### Everything Acoustic!

Thanks to the support the acoustical community continues to offer RPG, we are expecting exponential growth this fiscal year. This is an amazing statistic for a company in its 24th year. We take pride in the fact that we are unique in offering the largest range of diffusors, The RPG Diffusor System, the largest range of absorbers, The RPG Absorbor System, a new state of the art acoustical shell called Overture, novel technology like microperforated, light transmitting plastic absorbers, 4" deep modal absorbers effective to 50 Hz, a complete ceiling system called Waveform, including monoradials, biradials, splines and bicubic surfaces, free absorption and diffusion testing, free computer model assistance, continuing education services, publications in peer review journals and continuous product and research updates. *This is only the beginning....*

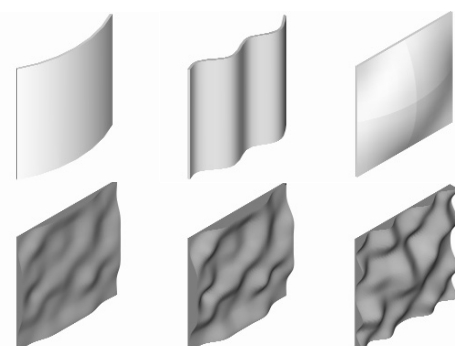
#### CONTINUALLY EVOLVING....

##### Follow the Leader.

After twenty four years, old school acoustical manufacturers are beginning to notice acoustical diffusors. As I mentioned in the last issue, this could be good for the industry, if they offered innovation. Unfortunately they do not and are mere attempted imitation of RPG technology. If the product is patented, as many are, a would be competitor must make a change in the design. However, without the scientific background in diffraction physics, the consequences of a change to avoid patent infringement cannot be evaluated. If an acoustician specifies this product, how can he be sure it actually functions. The reason RPG will continue to be the leader in the acoustics industry is because we do have the scientific background to continually innovate and stay decades ahead of the would be competitors. To this end, RPG has evolved the venerable QRD into the patented Modulated Optimized Diffusor or MODffusor and MODfractal, we have evolved the venerable FlutterFree into the patented FlutterFree-T, with significant increase in performance and we are evolving the BAD panel into a hybrid Ternary diffisorbor, with significantly better performance. So why rely on competitive diffusor copies, which use 30 year old technology, when you can specify innovation from RPG.



#### WAVEFORM FOR WALLS AND CEILING



RPG is now offering a complete range of ceiling diffusors/reflectors in either wood or glass fiber reinforced gypsum. The wood surface weight and finish options are endless. The GRG options include 1/8", 1/4", 3/8" constrain layer damped and 1 5/8" honeycomb laminates. The Waveform system ranges from a simple single radius arc, called a Monoradial; an optimized 1D curvilinear panel, called a Spline, because it's design is facilitated using a cubic spline; a double radius arc, called a Biradial and a 2", 4" and 8" deep 2D contoured surface, called a Bicubic. With all of these options, the Waveform system is one of RPG's fastest growing product lines for schools, worship spaces, auditoriums, etc. All at competitive prices to conventional offerings, only acoustically optimized, with infinitely more options.

### RPG EXPANDS SHAPE OPTIMIZER

RPG's Shape Optimizer in combination with our patented Aperiodic Modulation has resulted in the next generation of sound diffusors and acoustical shells. In this issue, we describe an extension of the Shape Optimizer which allows optimization of stage canopies. The reflecting surfaces around a stage area play an important part in enabling ensemble amongst musicians. Energy must be reflected back to the stage to enable musicians to hear themselves and others and so achieve the correct rhythm, intonation, balance, and timbre. Gade summarized the current understanding of stage acoustic requirements; in particular, when stage reflections should arrive, and how loud they should be. This note concentrates on the design of overhead canopy arrays, in particular investigating effects of array density, size, shape and position. This aspect has surprisingly been little researched, although work by Rindel investigated similar questions to those being posed here.

The advent of modern computer processing power allows stage canopy arrays and towers to be optimized using iterative algorithms, based on wave-based acoustic prediction models. A shape optimization program has been developed to optimize both the shape and tilt of overhead canopy arrays. Previously, the height and density have been specified, based on experimental evidence and lighting/scenery considerations. The program has recently been updated to address the question of optimal canopy density, size, shape and depth and some preliminary results from this work are presented here.

In previous work, the width and depth of the canopy elements were fixed at the start of the optimization, as was the location of the canopy elements. In this work, the effects of allowing the optimization process to choose all the defining parameters for the canopy have been explored. For simplicity, the canopy being designed

extends unbroken across the stage width. In this case, the optimizer controls, the size; the number of spline points; the positions of the spline points, the number of the canopy elements; the location of the canopy elements in terms of their positions upstage/downstage and height; and the tilt of each canopy element.

The stage was assumed to be 12m deep. The canopy elements were assumed to be evenly spaced upstage-downstage. The canopy was constrained to be within 8-10 m above the stage floor, so that the reflections are delayed by an amount known to be good for ensemble and support. The Support metric developed by Gade was used as the optimization criterion. The procedure is to place a source and receiver 1m apart on the stage and calculate the ratio of the early reflected to direct sound energy. We have calculated the percent open area, average panel width, average panel depth and average number of canopy panels and number of spline points defining the shape versus 2D Support from -27 to -12 dB with the 95% confidence limit in Figures 1-4.

Therefore, one can use these curves to design a canopy array by simply choosing the required Support. The average open areas for the different target support values are shown in Figure 1. For a target value of -15dB, the canopy occupies most of the available space. For the -24dB case, the canopy occupies only a fifth of the available area. Figures 2-4 show that when a high support value is required, the canopy is fuller, the canopy elements are wider and deeper, and there are more canopy elements in the array, in comparison with canopies with lower support values. Figure 4 also shows that fuller canopies tended to have fewer spline points and simpler, less wiggly shapes than canopies with larger open areas. For high support panels are less than or equal to 48" x 48" x 10".

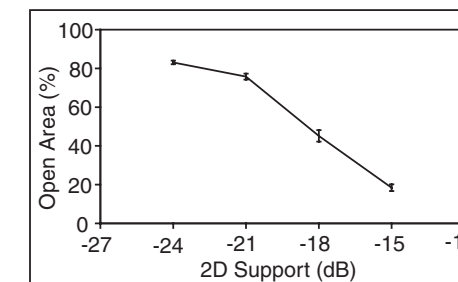


Figure 1. Open area vs target support value

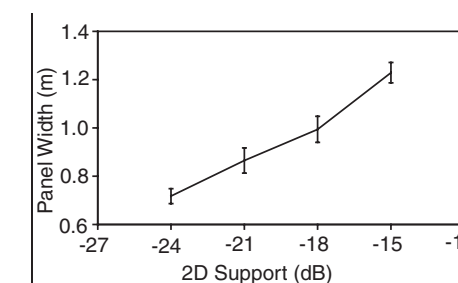


Figure 2. Panel width vs target support value

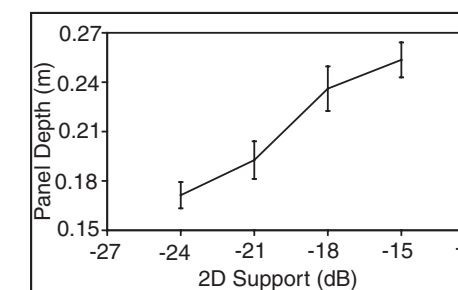


Figure 3. Panel depth vs target support value

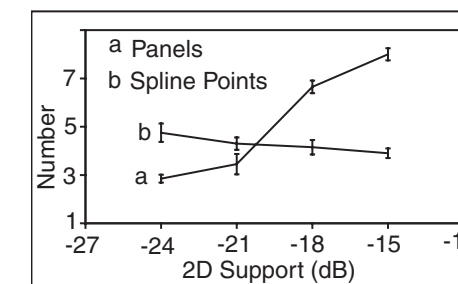


Figure 4. Number of panels and number of spline points on the canopy vs target support value