

OVERHEAD CANOPY DESIGN



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In this issue, we describe two custom canopy designs and conclude our overhead canopy design tutorial.

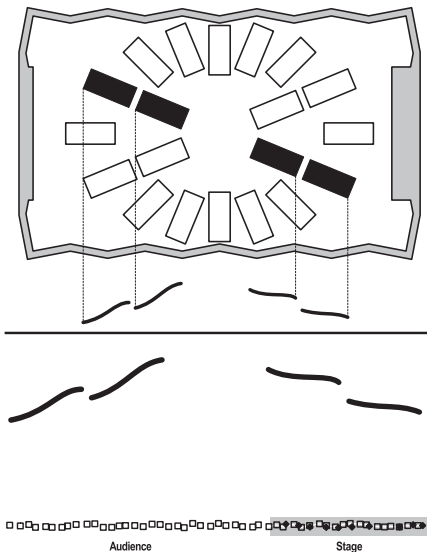


Figure 1. Top: Reflected ceiling plan showing 20 canopy elements. Bottom: The four black canopy elements are shown in section, along with 10 sources on stage (black diamonds) and 50 receivers (open squares) in both the audience and on stage.

Legacy Hall

We begin with the Rivercenter Performing Arts Facility, in Columbus, Georgia. The architect specified a rather sparse array of twenty 6' x 14' sinusoidal shapes at various heights, forming an interesting elliptical bell-shaped pattern that covers both the stage and the audience. There is no proscenium and the overhead canopy basically formed the ceiling design, as shown in Figure 1. There was a concern by the acoustician, Steve Haas, Jaffe Holden

Acoustics, Norwalk, CT that this sparse array would not provide uniform coverage. RPG was asked to collaborate 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. 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 1 illustrates plan and section of the optimized shape and tilt of four of the twenty optimized canopy elements.

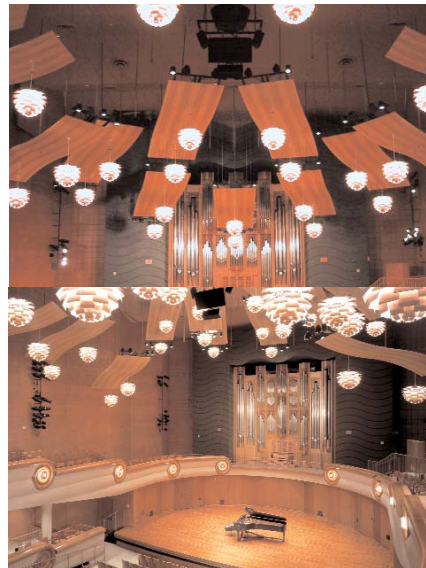


Figure 2. Legacy Hall, Rivercenter, Columbus, GA

Kresge Auditorium

Kresge Auditorium was designed by the late Eero Saarinen and built in the 1950s. Admired as it was for its clean lines, the design posed a serious challenge to BBN, the acoustical consultants. Employing arrays of panels to direct sound away from the curved ceiling, they successfully neutralized the auditorium's less than favorable geometry. However, over time, the



Figure 3. Kresge Auditorium MIT, Boston, MA. Top: Stage canopy. Bottom: Audience clouds.

hall's initial success had been tempered by complaints about acoustical non-uniformity in the house and the musicians' inability to hear on stage. Both issues were addressed by Acentech, the successor to BBN, as part of the 1998 renovation of the building. Acentech's approach was simple and, in view of recent advances in the science of auditorium acoustics, obvious. Rather than reflect all the sound to the audience, they chose to reflect some of it back to the stage and spread the rest as uniformly as possible over the seating areas. To do this, they turned to RPG Diffusor Systems who, using advanced computer technology, designed new overhead canopy panels that not only met the acoustical goals, but are a fitting complement to the hall's architecture. To quote MIT's Lawrence Isaacson: "As a conductor, I can hear my ensemble much more clearly, allowing for greater ease in correcting balance and pitch problems; as a player, I can hear the other musicians across the stage much better than before; and as a listener, I have noted that now most all of the seats in the auditorium boast an even, balanced sound."