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*acoustic specialists
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SH ACOUSTICS AMENDS and RATIFIES ACOUSTICAL UPGRADES to the NATIONAL CONSTITUTION CENTER

SH Acoustics – the leading designer of acoustics and audio for museum environments – has just completed two important efforts for the National Constitution Center in Philadelphia to improve overall sound quality in their Grand Hall atrium and DeVos Exhibit Hall.

SHA President, Steve Haas, was the original acoustic & audio designer for NCC's permanent exhibition gallery and Kimmel Theater. Subsequent to the museum's opening in 2003, Haas has maintained an ongoing consulting relationship with NCC to ensure that the facility's quality of sound was either maintained or, in some cases, newly addressed.

Grand Hall Acoustics

The Grand Hall is an enormous atrium used by visitors to NCC as a gathering space prior to entering other areas of the museum. Since the building's genesis, it has also become one of the most sought after spaces in the Philadelphia region for special events that include – political speeches, corporate functions, weddings, private parties and many other types of activities. This is primarily because of the stunning architectural look and feel to the upper level of the Hall as well as the caché of holding one's event at such an important institution.

However, as with so many museums, the Grand Hall's acoustics were not appropriately "tamed" in the beginning to allow for a pleasing aural experience during events. Combining a room volume of over one million cubic feet with surface materials that include stone flooring, full-height glazing to the exterior and undulating drywall ceilings resulted in excessively loud music events and speeches that were barely intelligible.



NCC event staff reached out to Haas to help develop a solution to this challenging problem. He and his team at SHA proceeded to evaluate the existing conditions and determined that the reverberation time (the time it takes for an impulsive sound, like a handclap to disappear) of the existing space was around 10 seconds – over three times as long as a large cathedral! Given this condition, the solution would certainly not be trivial or inexpensive – especially since matching the existing aesthetics of the Hall was paramount.

After evaluating several solutions, SHA chose to recommend the application of a seamless, micro-porous acoustic plaster known as Baswaphon to large triangular sections of the ceiling. Haas had successfully used Baswaphon in a number of commercial and residential applications and was very confident in its acoustic performance and aesthetic character. Based on the need to raise the appropriate funds for this project, NCC and Haas developed a two-phase implementation plan in which the first stage would concentrate the Baswaphon treatment over the main event area, with the second stage further distributing additional material on sections throughout the other areas of the Hall. In January 2009, the first stage was installed. Along with previous upgrades that had been done to optimize the speech reinforcement audio system using a line array loudspeaker system from Renkus Heinz, the inclusion of the Baswaphon sound-absorbing treatment has greatly improved the use of the Grand Hall for special events.

Exhibit Hall Audio Tune-Up

Well-designed audio systems in exhibit galleries typically use the latest in a variety of technologies to be able to deliver the sound of media productions in very effective ways. Haas and his now-retired audio design partner, Bill Lobb, originally created a wide variety of audio solutions into the NCC exhibits to address the desires of the exhibit design team, led by Ralph Appelbaum Associates, to have a multitude of media programs. This included several mini-theaters in the open space, numerous interactive stations and looping videos and other audio programs almost continuously occurring along the perimeter of the circular drum-shaped gallery.



Through careful implementation of acoustic treatments combined with audio solutions that either focused or dispersed the audio as necessary and the ability to use digital signal processing (DSP) to tonally shape and balance the large amount of sound, the exhibits had what was necessary to achieve the one practical goal that Haas always seeks. That is, the ability, when at an individual exhibit, to be able to concentrate on the sound of that exhibit without being distracted by other audio programs in close proximity.

Haas and Lobb had performed their first audio tuning in early 2004, shortly after NCC opened. It is not uncommon, though, with advanced technologies and active museum environments for a variety of conditions to change and affect the tuning and balance of audio programs. Since Haas had been to NCC at the end of 2008 relating to the Grand Hall project and happened to witness that things weren't sounding "quite the way they should" in the gallery, NCC's technical staff asked him to come back in March 2009 to perform a fresh tuning.

Haas and SHA senior consultant, Jeremiah Flaherty, started the process by evaluating during museum hours exactly how patrons were tending to interact with each of the exhibit areas. Even the docents were very helpful at providing insight for SHA to make subjective judgment calls about audio level priorities. Once this was done, they proceeded over the course of two days to use the existing DSP units to establish the ideal tonal shaping and level balance throughout the exhibits as well as to provide the NCC staff with a report on any issues of audio maintenance or media productions that had been observed.

Having the right audio "tools" designed into a media-intensive exhibit gallery is a great first step to achieving high quality of sound. Like any tools, though, they do need to be sharpened and calibrated as time passes.