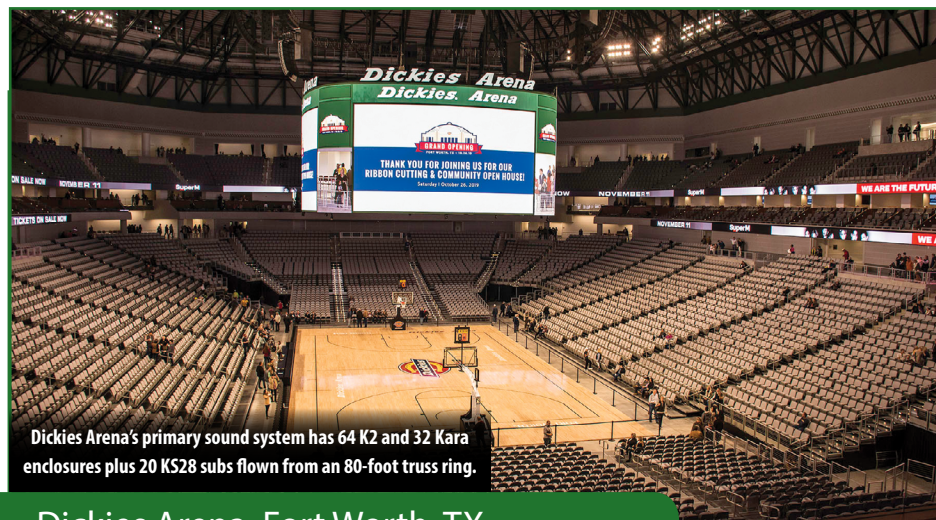


# SPORTS FACILITY PROJECTS

By Thomas S. Friedman

## Sound System Upgrades Score Points with Fans

Sportsgoers have embraced the fan experience in a big way, and attendees are used to hearing music playbacks and play-by-play announcers with pristine clarity and intelligibility — all at rock 'n' roll levels, of course. Thankfully, the days of underpowered arena center clusters or stadiums ringed by paging horns mounted on 20-foot poles are long behind us. Meanwhile, versatility is essential, as facilities of all types look to maximize a venue's ROI by supporting the multi-use concept. Here, the sound system must be flexible enough to handle tasks that change on a day-to-day basis, whether a graduation ceremony, music concert, championship tournament or monster truck rally. With that in mind, we decided to look at a number of recent audio upgrade projects — each of which met success by applying the right gear in the right situation.



Dickies Arena's primary sound system has 64 K2 and 32 Kara enclosures plus 20 KS28 subs flown from an 80-foot truss rig.

### Dickies Arena, Fort Worth, TX

The new 14,000-seat multi-purpose Dickies Arena in the Fort Worth's Cultural District opened on Oct. 26, 2019. The home of the iconic Fort Worth Stock Show & Rodeo, the venue will also host NCAA basketball tournaments, gymnastics, ice hockey, concerts and more.

The technology centerpiece of the arena is an L-Acoustics system comprising K Series and A Series elements, combining into the single largest arena sound system in L-Acoustics history.

Two dedicated systems were integrated: one for Dickies Arena's Main Bowl, and one for the adjacent Simmons Bank Pavilion, a multi-use exhibition and meeting space. Fort Worth-based AV systems integrator Electro-Acoustics installed the systems. AV design consultants at WJHW handled system design and oversight, working with Dickies Arena ownership, Trail Drive Management and The Beck Group.

The main audio rig hangs from an 80-foot motorized truss ring, circling a massive center video display. This includes eight main arrays, each configured with eight K2 enclosures and four Kara elements. A beefy subwoofer system (four arrays, each with five KS28 dual-18 subs in a hypercardioid configuration) provides LF punch.

Four A-Series clusters (A15 Focus and A15 Wide) are integrated underneath the center video display for floor coverage. The system was designed using L-Acoustics Soundvision 3D modeling software, and is powered and processed by 38 LA12X and eight LA4X amplified controllers. A P1 processor handles AVB distribution to the amplified controllers and provides console switching for touring events and guest consoles, all managed by L-Acoustics LA Network Manager software.

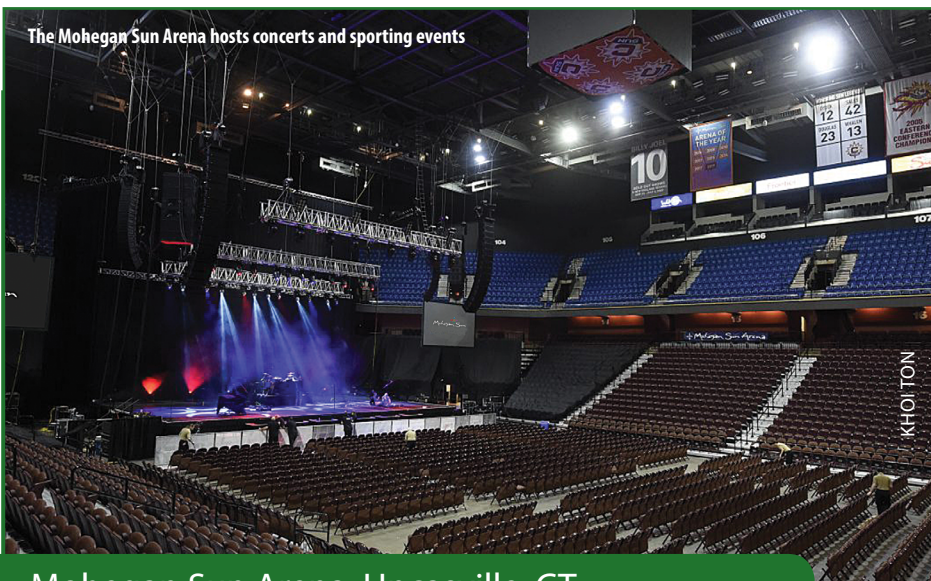
In addition to the main system, eight short-throw X12 coaxials are available as wedge monitors and for multi-use sound reinforcement, powered by an LA12X, and the FOH position benefits from a pair of self-powered 108P monitors.

Dickies Arena also features the Simmons Bank Pavilion, a 10,500-square-foot space, plus 86,865 square feet of exhibit space that surrounds the Pavilion. At each end of the Pavilion, there is an array of three ARCS Focus and one ARCS Wide under two SB18m to cover the full space.

Bill Shaw, assistant GM for Trail Drive Management Corp. at Dickies Arena, notes that the audio setup was a critical consideration for the venue's development. "This is intended to be a truly multipurpose venue, and our primary goal is to provide a premium experience, with audience engagement being the number one priority," he notes.

"The main concern was directivity and coverage, and the K2 arrays and cardioid-configured subs are the best combination to assure the sound stays on the seats," says Electro-Acoustics president Chris Jordan. "The sound levels are consistent from seat to seat, plus the tonality of the system is just unbelievable. This venue truly chose a winner when it picked L-Acoustics."

**Dickies Arena**  
Capacity: Concerts, 14,000; basketball, 13,300; rodeo, 9,300  
Key Components: L-Acoustics K- and A-Series  
Designer: WJHW  
Integrator: Electro-Acoustics



The Mohegan Sun Arena hosts concerts and sporting events

### Mohegan Sun Arena, Uncasville, CT

To attract more world-class musical artists and further enhance the audience experience, the Mohegan Sun casino-resort invested in a Meyer Sound LEO Family reinforcement system for the resort's 10,000-capacity arena, which hosts concerts and doubles as home for the Wilkes-Barre/Scranton Penguins of the American Hockey League.

The comprehensive sonic upgrade is anchored by LYON line array mains, Leopard line array side hangs and 1100-LFC low-frequency control elements for low-end punch.

Mat Diamond, an on-call engineer beginning in 2001 and audio lead since 2007 notes that when he first arrived, the venue had old-tech line arrays from another manufacturer. "We had since updated with Meyer Sound systems for side hangs — a big improvement. When we heard the LEO family, we decided it was time to finish the job. We have Leopards for side hangs now, and we're using the same technology but with longer throw in the LYON boxes for the front."

Diamond also banks on Meyer Sound's reputation for a neutral, linear response. "We get everything through here. For example, coming up next week, we have Godsmack one night and Gladys Knight the next. With this new rig, we can line up three or four shows like this in a row, and know it will handle them all beautifully."

The LYON arrays employ Meyer's new TPL-3 TruPower limiting, which adds up to 2.5 dB of HF headroom, extending LYON's reach and coverage. "I can push that box as far as we dare go safely, and never hear any limiting," notes Diamond.

The end-stage configuration comprises dual hangs, each with 16 LYON line array loudspeakers (12 LYON-M over four LYON-W) with 16 Leopard line arrays on each side. The 24 1100-LFC elements are deployed in both flown and ground-stacked cardioid arrays. The digital heart of the system is six Galaxy processors, all linked via an AVB network. Diamond gives a tip of the hat to Andrew Hall of Crow Solutions for network configuration and general system consulting.

The self-powered system can be quickly reconfigured for any event and internal amplifiers eliminate the need for amp racks. By drawing on Mohegan Sun's existing Meyer Sound inventory, the base system can be expanded to cover 360-degree, in-the-round concerts. Each configuration has been precisely tuned to the room in the Galaxy processors, so once the alternate configuration is hung, it's ready to go with the click of a mouse.

The new system is a boon in negotiations with top acts, according to technical production assistant Robert Nolan. "We're a casino in a relatively remote location and with some big-name acts, I'll sense a hesitation to use a house rig," he says. "But when I drop on them that we now have a full Meyer rig with LYON, Leopard and 1100s, they say, 'We're good. We're done on sound. Let's talk about lighting.'"

**Mohegan Sun Arena**  
Capacity: 10,000  
Key Components: Meyer Sound LEO system  
Designer: Mat Diamond



The Capital One Arena now sports an EAW Adaptive line array rig.

### Capital One Arena, Washington, D.C.

Capital One Arena in Washington, D.C. is home to the Washington Capitals NHL hockey team, the Washington Wizards NBA basketball team and Georgetown's NCAA men's basketball. Headquartered two hours away in Manheim, PA, national AVL integration firm Clair Solutions embraced the task of modernizing the Capital One Arena.

"Capital One Arena's previous sound system was 20 years old," notes Jim Devenney, Clair Solutions senior systems designer. "It lacked clarity in some seats and was not up to modern expectations for a live arena experience. The owners worked with Stuart Shatz at WJHW consultants to draft several possible sound reinforcement solutions. They chose us based on our competitive pricing, our well-established record of successful jobs and our proximity to Capital One Arena."

At the heart of the new system are six self-powered EAW adaptive line array clusters, each with nine Anna full-range components and five Otto subwoofers. To minimize runs, Clair Solutions built and installed custom equipment racks to fly behind each cluster for I/O, power distribution and network switches and ran new fiber from the mix position to the equipment racks. The fiber carries signal (fully-redundant Dante, plus analog backup) from a BSS Blu DSP and networking system that takes its feed from an existing console at the mix position.

In addition, the fiber lets operators steer the EAW system. For example, when the upper bowl isn't used, the upper Anna components can steer down to reinforce the lower bowl. Clair Solutions worked with Mountain Productions to install a custom Niscon/Raynok hoist control system allows the EAW clusters to raise and lower to storage, maintenance and use positions, either individually or as a group.

The main EAW clusters handle the majority of the arena; 24 EAW QX364 full-range speakers cover the top of the upper bowl, with delays from the BSS DSP ensuring coherent arrival times relative to the main system. Sixteen Fulcrum AH463 horns aiming straight down from above the hockey dasher to cover fans at the edge of the glass are unused for non-hockey events. Eight more Fulcrum CX 1265 speakers cover the court area from the scoreboard. Crown DCi amplifiers drive all the fill speakers.

**Capital One Arena**  
Capacity: 20,000  
Key Components: EAW Anna, Otto, QX364; Fulcrum Audio AH463, CX 1265  
Designer: WJHW  
Integrators: Clair Solutions, Mountain Productions

### Danville Braves Stadium, Danville, VA

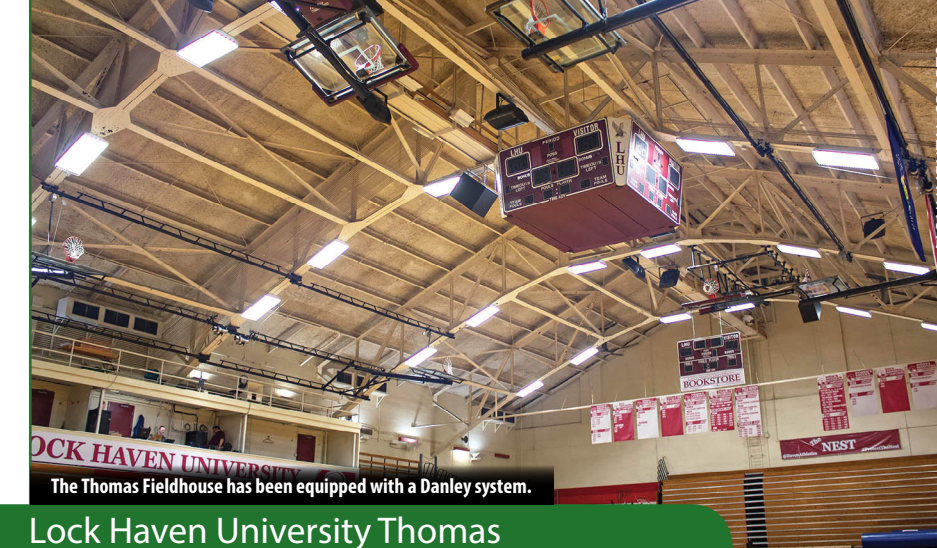
"The Danville Braves contacted us because with their old sound system — they had uneven coverage in the seating areas and couldn't hear anything whatsoever on the field of play," relates Paul Boone, the director of operations at Piedmont Multimedia LLC, of Hillsborough, NC. "They had 12 older small weatherproof loudspeakers scattered through the seating areas, aimed at different locations along the grandstand and around the apron of the bleachers. They needed a solution that would do a better job with fewer loudspeakers."

With years of experience designing and installing systems for outdoor venues, Boone knew that PreSonus WorxAudio's weatherized S-X2 all-in-one weatherized compact line arrays would provide a superior solution for the 2,588-seat stadium. "I've been associated with PreSonus and WorxAudio from way back," he notes. "I used to sell WorxAudio loudspeakers as a contractor, and we installed one of the first weatherized packages that WorxAudio built."

Boone brought in a (non-weatherized) X2 system and set it up temporarily above the press box, in the center of the main grandstand. "We played music and talked on a wireless mic," he recalls. "The coverage is very wide, with 160° of horizontal dispersion. Even with just one box, the groundskeepers working on the field could hear everything clearly. The stadium management loved the WorxAudio loudspeakers. Compared to their old sound system, even one X2 was a night-and-day experience."

Working with PreSonus' Commercial Division team, Boone devised a system design. "We deployed three weatherized S-X2s, putting one in the main grandstand, one firing across the first base line, and one firing across the third base line," he details. "It looked really good in the EASE report, and it worked out great in practice. The stadium people were impressed with the demo and design."

To drive three full-range S-X2s, Boone chose six PreSonus WorxAudio PDA1000-R power amps, two for each S-X2. "The PDA1000-R is a great amplifier," Boone asserts. "It's a really ef-



### Lock Haven University Thomas Fieldhouse, Lock Haven, PA

Lock Haven University serves 4,600 students in the north-central region of Pennsylvania and its Lock Haven Bald Eagles basketball and wrestling matches are played at the Thomas Fieldhouse gym. Built in 1935, the venue has long suffered from boomy acoustics, a problem solved by the recent installation of Danley OS80 point-source speakers and TH118 subs, which offer phase-coherent intelligibility and tight pattern control.

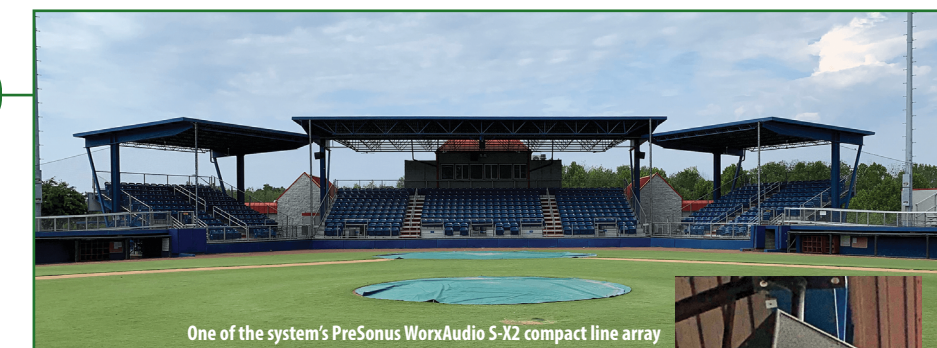
"The old system that used numerous front-loaded drivers, coaxial and horn products produced a mash of phasing problems. The old system could go loud, but it wasn't clear. Intelligibility was the big problem. Danley was the right choice," says Tyler Hoffman of Harrisburg, PA's Illuminated Integration, the firm that installed the system. Skip Welch, eastern regional sales manager at Danley Sound Labs and a veteran integrator, designed the system in collaboration with LHU director of information technology Bo Miller.

The gym has seating on one side of the court and at both end zones. Three Danley OS80 loudspeakers cover the sideline bleachers and two OS80s cover each of the two end zones. An eighth OS80 fires straight down to cover the court itself. Seven additional OS80s cover a warmup gym, and all of the loudspeakers are placed on zones so they can be turned on or off to accommodate different kinds of events — including graduation ceremonies and different size crowds. Three Danley TH118 subwoofers, one over each section of seating, complete the deployment. Two four-channel Danley DNA 10k4 Pro amps with 96kHz DSP power the system.

Once it was installed, renowned acoustician and Danley engineer Doug Jones traveled to the site to tune the system for maximum intelligibility. Despite the gym's tremendous reverb time and overall boominess, the Danley OS80s' focused, phase-coherent audio measured at 0.7 STI with single zones turned on and 0.55 with the entire system engaged. Both measurements are a worst-case scenario because there were no bodies to absorb the down-firing sound.

"We were worried it might just turn into a huge echo chamber given how acoustically challenging the space is," Miller said. "I was also concerned that only having three TH118 subs wouldn't give the low-end impact I was hoping for, but initial testing has shown the design to be sound, and it works quite well."

**Lock Haven University Thomas Fieldhouse**  
Key Components: Danley OS80, TH118  
Designer: Skip Welch, Bo Miller  
Integrator: Illuminated Integration



One of the system's PreSonus WorxAudio S-X2 compact line arrays

cient Class-D amplifier that puts out good power but doesn't take a lot of energy or produce a lot of heat." Analog audio was distributed from the amps to the speakers using an 8-conductor cable for the high and low frequency elements to each box.

To keep things simple for the P.A. announcer, the Piedmont Multimedia team provided a small analog mixer, a wireless mic and two handheld Shure mics with switches so the announcer could quickly and easily turn them on and off.

Installing the new system proved to be the easy part. "It took us longer to pull down the 12 older loudspeakers than to hang the new S-X2s and pull the wire," reveals Boone. "We only spent three days onsite, total."

The Danville Braves' stadium not only got a high-quality system, adds Boone, "it was simple, inexpensive and a great package. The customer spent a whole lot more on their old 12-box system that we replaced than they did on the new system with three WorxAudio S-X2s and got far better sound quality and coverage. They're impressed."

**Danville Braves Stadium**  
Capacity: 2,588  
Key Components: PreSonus WorxAudio S-X2 line arrays  
Designer: Piedmont Multimedia  
Integrator: Piedmont Multimedia