

Better sound for athletic facilities



The audio system in South Milwaukee High School's new gymnasium minimizes reverb by putting sound only where it's needed.

Building top notch audio into gyms and stadiums

The clock ticks to zero, the airhorn blasts and the crowd soars to its feet with a single roar. At that point no one in the gymnasium expects to hear anything but the joy of victory. Two hours later every scuff mark is gone off the shiny floor and 600 folding chairs have been set up for tomorrow's graduation. That's when the crowd will want to hear the single voice of the valedictorian, even in the highest row of the bleachers. There is a science to building the right gymnasium sound system. At Lewis Sound and Video in Waukesha, Wisconsin, they call the alternative the "cardboard box" effect—the noise and echo of concrete block walls, high ceilings, steel beams and hard shiny floors.

"A gymnasium can be an acoustical nightmare," says CEO Susan Lewis, whose firm has been the solution for many elementary, high school and college audio dilemmas over the years. A newly constructed gymnasium may use more acoustically-friendly materials than gyms built years ago, but it is still a great big box. Lewis's firm takes a scientific approach, using EASE, an acoustic design software, to calculate just what will work and what won't. By entering exact measurements, square footage, and the types of acoustical materials already in the gym into the computer, and knowing exactly where a client needs audio and where he doesn't, they can come up with an accurate acoustical model before any installation begins.

Bounce the balls, not the sound

Gymnasiums offer a lot of variables. "Most gymnasiums today have two, three, or four basketball courts on them—multiple courts, different sizes, sometimes with temporary dividers between them," says Lewis.

At least a dozen speakers hang from the ceiling at South Milwaukee High

School's new gym. The room boasts four basketball courts surrounded by a second floor running track. "This is a field house," says Athletic Director Ante Udovicic. "But the sound is a lot better than you would expect in a large space like this."

When the pompom squad is out on the court dancing to the beat, the audience wants to hear the music, too. "The bigger, more powerful, base-heavy sound systems are more and more a part of the gym," says Lewis. "To make these work, the speakers can be zoned and routed and turned on and turned off. You could put 300 people in the north bleachers, take out a wireless mike and turn on only the speakers that serve those bleachers."

The reason to do this is that a seated audience is much more sound absorbent than empty bleachers or a hardwood gym floor. If you can direct the sound only at the audience, you'll avoid a lot of unnecessary reverb. Lewis suggests that "the last thing you want to do is put sound into the full court if you're only using half, because that extra sound is simply going to bounce around." One of the biggest variables is the size of the crowd. Basketball games are a big draw, but unless your volleyball team is winning, the bleach-

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ers can be half empty. "People help," says Lewis. "It's the sparsely populated games that are difficult because that sound echoes off the bleachers."

Ask the right questions

In a design/build scenario, asking a client exactly where the sound

will be needed and when is essential. Lewis uses the example of an ice rink, where the skater needs to hear the music, and the audience needs to hear the whole program. When the skater is practicing alone, there's no need to send sound to an audience that isn't there. "You need a way to control different areas within the sound system," says Lewis. "One zone that reinforces the rink, and one that reinforces the audience."

A big basketball game means all speakers on all the time. With a track meet they just need the speakers over the track to be firing. "In any big space, less is better," says Lewis. "For graduation they're going to set up a stage at one end of the room and reduce the level of the loudspeakers right over the stage. Then they delay them sequentially further and further back into the room to give a realistic presence to the speakers on the stage. Delay provides phase coherency: that is, loudspeakers in the back fire slightly later than those in the front, to compensate for the time it takes for the sound to travel from the front to the back of the room. This keeps the sound from becoming degraded."

Safety measures a must

Keeping the sound system safe is also a factor in a room with multiple uses and users. Large speakers hung from the ceilings make great targets. "You do have to have your speakers in secure locations," says Lewis. "You're going to have 14 year old boys try to bounce that ball so high that it hits the speaker." Gymnasium speakers are often caged to avoid such mishaps.

"In a typical gymnasium you have to decide who will use the system," says Lewis. "If it's just the high school staff, controls can be in a secure staff room. But if it's the visiting little league coach, system controls may have to be in a more public area."

At South Milwaukee, Lewis installed two separate control panels, one on the gym wall for easy access, and one in the equipment rack in another room where security is a little tighter. "We can lock both control panels so that kids don't inadvertently flip the wrong button and can't figure out how to get it back," says Udovicic. "The wall panel controls the basics like room lighting, volume control, CD selection or fast forward or rewind, much like a boom box." The equipment rack contains the CD/Cassette players, presets for various speaker configurations, the wireless microphone receivers, amplifiers and other support equipment.

Take it outside

Outdoor sound systems for football and soccer stadiums present a whole new set of issues. The biggest challenge is not to offend the neighbors. Lewis Sound and Video was asked to solve the problem of audio overspill at a Madison high school a few years ago. "Their speakers were mounted too high on poles, says Lewis. "They couldn't get any contained energy so they just turned the

volume up, up, up and couldn't control where it was going." The solution, of course, was to lower the speakers and aim them just where the sound needed to be. "The first rule would be try to get your speakers as close to the audience as possible. The second rule is, know where your audience is, because the audience can be in different places." Running tracks and shot put pits are a sure sign football is not the only activity that will need sound reinforcement.

At Burlington High School it's not unusual for a trio of events to happen at once. The football stadium with surrounding running track is next to a softball field and a baseball diamond. In the middle is an announcers' tower that looks out on all three venues, so Lewis put the controls there. Users can configure the new sound system as three independent systems or combine them into one. Announcers in the tower can pick which venue they are calling. CDs and cassettes are operated from the control tower, and wireless microphones are available throughout the facilities.

Professional wireless microphone solved the problems at Marquette University High School's Quad Park, a soccer and track meet stadium. "We had a cheaper wired and wireless microphone, but we kept picking up police calls," says athletic director Richard Basham. "We finally went to two new wireless mics and now it works fine." One mic goes to the track announcer while the other goes to the Clerk of Course, the person telling people when and where to line up for the next race.

Outdoor acoustics are not usually a problem with audio systems, although Lewis Sound and Video has used EASE to help with the aiming of speakers. At Madison LaFollette High School the construction of a new football stadium in the middle of a residential neighborhood had nearby homeowners worried. Would they be listening to overspill from Friday night football games and early Saturday morning track announcements? "We used EASE there to fine tune our aiming. We knew exactly how high the bleachers were so we used them as a target. We didn't want to miss and we didn't want to overshoot."

High School gymnasiums and athletic fields are noisy by nature, and each one offers its own unique challenges when it comes to putting the sound where it needs to be. One gymnasium's sound system might be another one's headache. Using the best tools available, and a lot of experience, Lewis Sound and Video can make a cardboard box sing.



Loudspeakers are mounted close to the bleachers at Marquette University High School's Quad Park.



At South Milwaukee's football stadium, Lewis kept speakers low and aimed directly at the audience.