THORBURN ASSOCIATES INC.
Acoustic and Technology Consultants
eNewsletter

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In this issue:

Greetings

Welcome to our first edition of the e-format of our newsletter. Thorburn Associates Inc. has published a paper version of our newsletter since we opened our doors in 1992. At the request of many of our readers we have moved from a paper version to this electronic format. For now we'll only be sending out our newsletter in text version. We spend too much time on planes and trains as do many of our readers, where internet connection is not available, making viewing HTML style newsletters troublesome.

As always if you have an idea, question, suggestion please drop us a note at TA@TA-Inc.com for general information or eNews@TA-Inc.com for specific comments about our eNewsletter.

New Advances in Video Conferencing Technology H.264

A new video conferencing standard, H.264, delivers twice the video quality currently experienced in video conferencing meetings. H.264 provides a far more efficient mechanism for compressing and decompressing motion video. This mechanism or algorithm requires significantly less bandwidth to transmit a motion image than has previously been possible. For videoconferencing, H.264 requires only 50% of the previously required bandwidth to provide the same quality of image. This means that if current bandwidth is maintained, substantially higher video quality will be achieved or we can cut our telecommunications costs in half or by two thirds and maintain our current level of quality!

If you are using IP (internet protocol) based video conferencing in a large campus environment then H.264 will reduce the total network traffic, freeing up bandwidth for either additional meetings or other uses.

So what does all of this mean to us … if you or your client is going to invest in video conferencing equipment make sure that the system is H.264 compliant. While conferencing systems that support H.264 will communicate to older systems you will not see the benefit of the faster algorithm until both "ends" of the conference use H.264 compatible units.

Classroom Acoustics

More than three-quarters of the teachers in a recent poll gave the acoustics in their classrooms a failing grade. The problem is most commonly a "signal to noise" ratio issue, which results in poor speech intelligibility. In general terms – the room is too noisy and it takes a long time for sound to decay within

the room. Studies by Maxwell and Evans (1997) have shown that students in schools with high background noise levels tested lower than students in schools with lower background noise levels

Recently, the American National Standards Institute (ANSI) approved a new set of recommended acoustical specifications for schools (ANSI S12.60-2002). "The criteria, requirements, and guidelines of this Standard are keyed to the acoustical qualities needed to achieve a high degree of speech intelligibility in learning spaces," according to Paul Schomer, standards director for the Acoustical Society of America (ASA), which publishes the "Classroom Acoustics Design Guide" (2000).

"If followed, this Standard removes acoustical barriers to learning," he says. "It provides equal access to education for a sizable minority of school children in the United States who may have mild-to-moderate hearing, learning, or attention deficits, suffer frequent ear infections, have limited English language skills, or may otherwise suffer from a substandard acoustical environment. For teachers, working in a classroom that conforms to this Standard can reduce or eliminate voice strain and reduce stress."

The new ANSI Standard covers:
- Background noise from both inside and outside the building,
- Sound transmission of walls, floors, ceilings, and doors,
- Impact insulation of floor-ceiling assemblies above core learning spaces, and
- Reverberation times or the length of time for sound to decay.

BACKGROUND NOISE

The quieter a room is, the lower its background noise level, enhancing speech intelligibility and raising the room's "signal to noise" ratio. In the case of a teacher in a classroom, "signal" means speech and "noise" is the base noise level in the classroom without the teacher speaking. Noise is measured in Room Criteria (RC) or Noise Criteria (NC) values, which are commonly used to describe the noise from HVAC systems. The primary difference between the NC and RC curves is that the RC curves are more stringent in the low (rumbling) and high (hissy) frequencies.

When documenting the noise level in a room from the mechanical systems, all sources must be considered: How much noise is being transmitted though the wall or roof from the air conditioner unit itself? How much noise travels from the unit down the ductwork to the diffusers? Do the air diffusers create their own noise due to the airflow/air turbulence as air passes thorough the grill? And finally, how is the unit mounted to the structure and is it properly vibration isolated?

Mounting units over or in hallways, and then ducting the air into the classrooms, can resolve many of these acoustical issues. This helps to attenuate the noise from the unit. Silencers or mufflers can be installed in the duct run and acoustical lining can be added to further reduce the noise. If air quality is a concern, one may wish to install AP/Armaflex (manufactured by Armacell), instead of traditional acoustical duct lining.

SOUND ISOLATION

Unlike noise coming from within a building, exterior noise sources are measured by the A and C weighted decibel (dBA/dBC) system. The A-weighted decibel is filtered to respond to the way we hear, while C-weighting is closer to a true flat response. According to the Standard, the building shell should control outside noise sources to levels of 35 dBA. If the exterior C-weighted sound level is more than 45 decibels above the A-weighted sound levels, the Standard requires additional acoustical mitigations, for example at schools near airports, major rail lines, or roads with a high volume of truck traffic.

Sound Isolation or Noise Reduction between classrooms is an issue that must also be addressed. In general we have found that walls should have a minimum Sound Transmission Class (STC) of 50 as has been supported by the ANSI Classroom Acoustics Standard. When addressing sound isolation between rooms it is very important to look at all of the pathways for sound to enter the room: doors, windows, penetrations of the walls by ducts, pipes and conduits, and holes made in walls by recessed electrical panels and fire extinguisher cabinets. These can all significantly reduce the Noise Reduction properties of the partition.

REVERBERATION TIME

Another section of the Standard for Acoustical Design of Classrooms covers the build-up of noise in the room itself. This is typically measured in Reverberation Time (RT60), or the length of time it takes for sound to decay 60 decibels or to one millionth of its initial level. Reverberation can be reduced by installing sound absorbing panels or an acoustical tile ceiling system. A major design challenge in

classrooms concerns the need for wall-mounted writing surfaces to be abuse resistant while also non-reflective of sound.

The suggested Reverberation Times for classrooms are based on classroom size:

Less than 10,000 cu. ft. - 0.6 seconds
10,000 to 20,000 cu. ft. - 0.7 seconds
More than 20,000 cu. ft. - consult an expert

In addition to these specifications, the Reverberation Time for distance learning rooms should be less than 0.5 seconds, with no discrete echoes.

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As school districts begin to adopt this standard, architects and engineers will need to address these issues just as they do for egress and heating and cooling building codes. While primarily directed at K-12 schools in the United States, the new Standard also could be applied internationally and at the college level. ANSI S12.60-2002 (Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools Standard) is 50 pages long. The entire document can be downloaded for $35 from the ANSI web store http://webstore.ansi.org/ansidocstore/.

This is an abridged version of the "Classroom Acoustics ANSI Standard" article that Steve Thorburn Authored for Archi-Tech magazine in their July/August 2003 issue.

ADA and Audiovisual Systems

Every time a sound or speech reinforcement system is designed and installed a hearing assistance system must also be included. ADA Section III-7.5180 Assembly Areas requires:

- Fixed seating assembly areas that accommodate 50 or more people OR have audio-amplification systems must have a permanently installed assitive learning system.
- Other assembly areas (not covered in above) must have a permanent system OR an adequate number of electrical outlets or other wiring to support a portable system.
- A special sign is required which indicates the availability of the system. The minimum number of receivers must be equal to 4% of the total number of seats, but never less than two.
- The exception is that this does not apply to systems used exclusively for paging, or background music, or a combination of these two uses.

The bottom line, as put by the America Speech-Language-Hearings Association's response to the ADA was "Ask people about their needs, show respect and sensitivity, use what works (not necessarily what is most expensive), and use your resources creatively and effectively."

Acoustics and LEEDS / Sustainable Building

As many of you know, the LEED (Leadership in Energy and Environmental Design) Green Building Rating System is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. It emphasizes state of the art strategies for five broad categories: sustainable site planning; safeguarding water and water efficiency; energy efficiency and renewable energy; conservation of materials and resources; and indoor environmental quality.

The last category, indoor environmental quality, is where Thorburn Associates comes into the picture. As an experienced design and engineering firm with several LEED projects completed, we can help the design team develop acoustic and audiovisual designs and choose products and materials to support sustainable design and LEED certification. Some of our recently completed projects include the following:

Hewlett Foundation Headquarters, Menlo Park, CA
Architect: Hawley Peterson & Snyder Architects

Located in Menlo Park, CA, is the new 48,000 sf headquarters for the William and Flora Hewlett Foundation. The success of the sustainable strategies used in the overall project earned it the first LEED v2.0 Gold rating in California and the fifth in the nation.

Thorburn Associates provided both acoustical and audiovisual consulting. Key components include six strategically placed conference rooms, each with videoconference capabilities; two meeting rooms for large presentations and community-wide meetings combinable into one larger room; and a centrally located boardroom. Open office areas, entry courtyard, and the exterior breakout patio all contribute to the open, interactive design, but makes the under floor air distribution system and the wall, floor, and ceiling acoustical treatments that much more important.

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SUGEN Building #3, South San Francisco, CA
Architect: DES Architects + Engineers

Located in South San Francisco, CA, this Biotech Laboratory Facility includes laboratory and support areas, and all building systems in 67,674 sq. ft. The design team incorporated materials into the interior design that include wall insulation made from recycled natural fibers, particleboard substrates made from straw, and renewable materials such as linoleum flooring.

As part of its LEED Gold certification, the design team incorporated 3 additional elements as new ways of incorporating environmental consciousness into building design: First, this building incorporates a LEED-CI display to promote education about sustainable building practices. Second, although the standard LEED credit does not include lab casework, this building has lab casework made from 100% FSC certified wood. As a third measure the building also has an HVAC system with an estimated energy savings of 46% above code requirements! The energy efficiency helps to reduce the self-generated noise of the system.

Thorburn Associates provided acoustical consulting for sound isolation and mechanical noise/vibration control as well as the design of audiovisual systems for the cafetorium, boardroom, and conference rooms. Key components include portable camera, speech reinforcement for the presenter, videotape playback, video conferencing, and computer graphics displays.

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Cesar Chavez Education Center, Oakland, CA
Architect: VBN Architects

Located in Oakland, CA, the Cesar Chavez Education Center represents more than a new school in an overcrowded school district. The design is a model CHPS (Collaborative for High Performance Schools) school. It incorporates high performance building techniques, which will be used as a teaching tool and a space to bring students, teachers, and the community together.

Acoustically, Cesar Chavez faced steep challenges. With Bay Area Rapid Transit (BART) tracks less than 400 feet from the nearest classroom on one side and the very busy International Boulevard flanking the school on the other side, Thorburn Associates and VBN Architects met the challenges using environmentally safe acoustic products.

To reduce sound from the outside sources, the classrooms are located as far from the BART tracks as possible. The school's windows are also more acoustically insulating – laminated and with a larger air space than is typical. Additional layers of gypsum board on the walls and ceiling provide a higher level of noise attenuation. Since mechanical systems are only needed for heating and ventilation, designers opted for in-room heating/ventilation units, but gave the teachers the option of turning off the nosier of the units' two fans. The system was also designed so that fan coils are capable of bringing in 100% outside air to give teachers the option of closing the windows when outdoor noise becomes an issue.

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In addition to these LEED certified projects, Thorburn Associates has several projects currently in the design or construction process, including the San Francisco Federal Office Building, that are registered with LEED with the intent of becoming certified once construction is complete. Additional information on LEED can be found at their web site: www.leedbuilding.org.

NEC Short Throw Projector – WT 600

NEC Solutions newly shipping WT600 has unprecedented short throw capabilities. The WT600 design uses aspheric mirrors instead of a traditional optical lens to create the world's shortest throw, producing a 40 inch diagonal image while approximately 3 inches from the screen and a 100 inch diagonal image from less than 26 inches away.

The WT600 mirrored reflection projector's short throw also gives presenters the freedom to move freely in front of the screen without obstructing the light path. This is a first for front projection technology. The short throw also enables projection in small meeting rooms that previously couldn't accommodate front projection, and offers significant space savings for rear projection screen applications.

This XGA native projector (1024*768 display pixel area) has a brightness of 1500 ANSI lumens. The lamp life is rated for up to 3000 hours, and at 32 dBA is one of the quieter projectors on the market. While it is not something we will use in every job, it is a product that definitely fills a niche when space is at an absolute premium.

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