Sounds

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A Newsletter from ***Stewart Acoustical Consultants*** *Our 28th Year*

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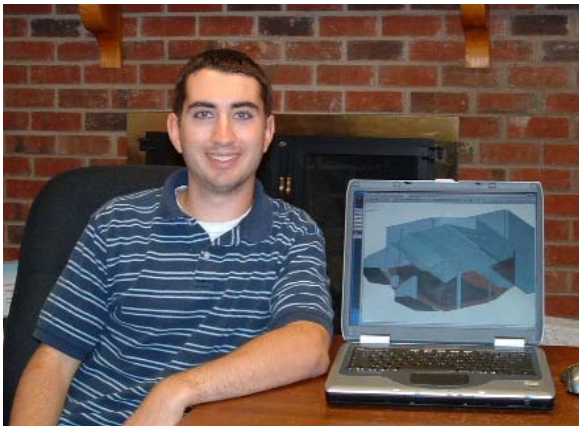
Merry Christmas and Happy Holidays

As we conclude our 28th year, we want to wish all our clients and friends a Merry Christmas and happy holiday season. We thank you for the confidence you place in us and look forward to continuing to work with you in the coming year.

Aaron Farbo – Acoustical Consultant

We are pleased to announce the promotion of Mr. Aaron Farbo to Acoustical Consultant. Many of you have worked with Aaron primarily on school projects or in field measurements. Mr. Farbo has become especially competent in the area of room acoustics and has contributed strongly to our transition to advanced room acoustics models based on ray tracing. He has a BS in Mechanical Engineering from the University of Hartford with a specialization in acoustics and has done graduate work at Penn State.



National Research Council Endorses Quiet Classrooms

At the request of the U.S. Green Building Council and others, the National Research Council (NRC), appointed the Committee to Review and Assess the Health and Productivity Benefits of Green Schools. The committee's charge was to "review, assess, and synthesize the results of available studies on green schools and determine the theoretical and methodological basis for the effects of green schools on student learning and teacher productivity."

In regard to noise, acoustics, student learning, and teacher health, the committee has found the following:

- Sufficient evidence exists to conclude that there is an association between decreased noise levels in schools and improvement in student achievement.
- Although there is strong evidence that reduced noise levels are most important for younger children because they are still developing speech discrimination, additional research is required to more precisely define possible needs for control of reverberant sound for younger children.
- Some available evidence indicates that teacher health, in regard to voice impairment, may be adversely affected by noisier environments, although the magnitude of the effect cannot currently be estimated as a function of exposure to noise.

The committee then recommended:

To facilitate student learning, guidelines for green schools should include requirements to meet American National Standards Institute (ANSI) Standard S12.60, "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools."

More information can be found here: http://newton.nap.edu/books/0309101204/html/42.html

Interim Guidelines on Sound and Vibration for Hospitals and Healthcare Facilities

At the request of the AIA and American Hospital Association, a joint committee of the Acoustical Society of America, the Institute of Noise Control Engineering, and the National Council of Acoustical Consultants has developed Interim Guidelines on Sound and Vibration for Hospitals and Healthcare Facilities. This document is now being reviewed by architects, hospital professionals. A copy of this public draft can be obtained at a cost of $30 under "documents" at www.speechprivacy.org. The document covers a wide range of acoustical concerns including the speech privacy requirements of HIPPA. Work continues by an ANSI working group managed by ASA to develop uniform guidelines for speech privacy for use in the healthcare, financial and other industries.

Positive Displacement Blowers

One of the common problems we encounter as a community noise source is the positive displacement blower, also often known as a Roots blower. They sometimes are used to power pneumatic conveying systems, but the most common application is in waste treatment plants where they are used to pump air into the treatment tank. These blowers are favored over alternative centrifugal blowers for low cost and high efficiency in pumping air. However, their cost advantage often disappears when the cost of appropriate noise control is considered. Positive displacement blowers produce a strong discrete tone that can be heard over long distances. It is a very distinctive and attention-getting sound similar to siren. Further if there are multiple similar blowers these tones can combine in such as way that they produce varying sound called beating. Anyone considering use of a positive displacement blower in an otherwise quiet area with residences within a few miles should get guidance on noise control. Alternative centrifugal blowers can often be used without any special noise control measures.

Ig Nobel Prizes Awarded

The 2006 Ig Nobel Prizes were awarded on October 5 at the historic Sanders Theater in Cambridge MA where W. C. Sabine conducted his experiments that led to the discovery of the relationship of reverberation time to sound absorption. The Ig Nobel Prizes are awarded by the publishers of the **Annals of Improbable Research** to honor achievements that first make people **laugh**, and then make them **think**. The prizes are intended to celebrate the unusual, honor the imaginative -- and spur people's interest in science, medicine, and technology. Prizes are handed out by actual Nobel Laureates in a fun filled ceremony. Two prizes this year were related to acoustics. The Ig Nobel Prize in Acoustics was awarded to D. Lynn Halpern, Randolph Blake and James Hillenbrand for conducting experiments to learn why people dislike the sound of fingernails scraping on a blackboard. The Ig Nobel Peace Prize was awarded to Howard Stapleton of Merthyr Tydfil, Wales, for inventing an electromechanical teenager repellant -- a device that makes annoying noise designed to be audible to teenagers but not to adults; and for later using that same technology to make telephone ringtones that are audible to teenagers but not to their teachers.

PEX Piping in Condominiums and other Critical Spaces

Recently we have seen an increase in the use of PEX plastic piping for supply pipe in many buildings. The piping is flexible allowing it to be installed without sharp elbows. Experience indicates it is quieter than other piping and we encourage its use. However, we are not yet in a position to eliminate traditional sizing and isolation requirements in condominiums. We have reached this conclusion after discussing the situation with a major manufacturer of the pipe and several other acoustical consultants.

Natural Rubber versus Neoprene

Many of you are accustomed to using Neoprene for sound and vibration isolation and have specifications requiring Neoprene. This requirement of Neoprene rather than natural rubber results from concerns about the durability of natural rubber many years ago and some early tests that indicated Neoprene had better dynamic characteristics than it does. New data now clearly shows low dynamic stiffness natural rubber to be a superior material for isolation and to have the necessary durability except in applications exposed to oil. The best news is that it is less expensive. We encourage clients to change specifications of isolation systems using neoprene to low dynamic stiffness natural rubber unless the application would expose the material to oil.

Careful Ceiling Installation Essential for Good Isolation

In some cases we have seen floor ceilings of wood-frame residential spaces perform reasonably well when gypsum ceilings were installed on hat channel instead of resilient channel, and when the perimeters of the ceiling were not properly isolated from the wall. That had led us to question the necessity of using the best resilient channel and carefully isolating ceilings. However, a paper presented recently by respected San Francisco consultant Tony Nash shows that careful ceiling installation can make a major difference. He investigated two wood-frame structures with poor airborne isolation between floors. He found the ceilings mounted on various products that were called resilient channel but were not very resilient, including different products even used on the same ceiling. He also found problems in the installation including shorting of the channel and failure to isolate the perimeter of the ceiling from the walls. He had the ceilings removed and properly installed using proper resilient channel and retested. The improvement in airborne isolation was dramatic, and most of the improvement was at the low frequencies. We usually think of resilient channel as providing benefit at higher frequencies, but when the air space is large, the benefit can spread to the lower frequencies. A future paper on impact isolation was promised.

More about Duke Chapel – Chaplain to the Rescue

In our last issue we discussed the fire during the renovation of Duke Chapel in the early 1970's. Duke Chapel was built in the 1920's using a special material called Akoustolith that looked like traditional limestone but was acoustically absorptive. It was one of the wonders of its day, a classical looking cathedral where you could actually understand speech. However, organ lovers hated it. In 1972, a new organ was being planned. The large acoustical consulting firm of BBN was asked to provide a recommendation to modify the surfaces to increase the reverberation without changing the appearance. A plan was devised using two coats of a clear sealer based on some preliminary tests. After treating a large portion of the chapel, it was observed and confirmed by testing that the treatment was not as effective as expected. The painters working under less than ideal conditions had not been able to duplicate laboratory results. It was uncertain how to proceed. The University Chaplain Howard Wilkinson took it upon himself to develop a solution. With careful experimental procedure he came up with a practical solution, demonstrating that two more coats applied as a first heavy one and then a light final coat would do the job. BBN concurred and they proceeded successfully.

An Acoustical Disaster in the News

We are frequently called in to investigate and develop fixes for existing buildings that have serious acoustical problems. These rarely make the news, but a new building for a school system in Illinois near St. Louis is making news. It was divided into two parts with the majority of the space used as a gym and multipurpose room, and the remainder to be a band room. The school found the building totally unusable. The building is round, topped with a concrete dome. Such shapes are an invitation to trouble unless very special care is taken in the design. It is not just reverberation but extreme focusing that causes problems. Attempts to resolve the problems with the addition of some acoustical banners failed. Now, the school board is suing the architects, and has hired an acoustical consultant to try to develop a way to make the space usable.

School Stadiums – Changing Attitudes

The most common source of outdoor amplified sound and music in many communities is the local school stadium. Often these are in residential areas close to homes. Historically, these have not been a source of complaints though the sound from them would not meet normal limits imposed on businesses. School facilities are usually exempt from local ordinances. Many families welcome the advantages of being near a school and accept the sound from the stadium. However, recently, we have been seeing more community resistance to new school stadiums near residential areas. The most notable cases so far have had extenuating circumstances that caused some of the objection. Also, the communities are split with some neighbors welcoming the stadium. However, those planning new school sites should recognize this possible change in community attitudes.

Greensboro Piedmont Triad Airport Part 150 Study Issued

The Piedmont Triad International Airport has conducted a Part 150 noise study to evaluate current and future noise and develop ways to reduce the noise impact. The airport will see changes with the coming of a new runway and air-cargo hub that will be the primary user of that runway. This new runway has its north end very close to an established neighborhood. Fortunately, for this neighborhood, most of the air-cargo landings and takeoffs will be at the other end of the runway. However, occasionally planes will have to land or take-off at this end when winds are strong. A very important result of the Part 150 study was a recommendation that older and much noisier Boeing 727 aircraft used by the cargo company not be permitted to take-off to the north on the new runway. These aircraft will be assigned to the older runway where they have historically flown.

Military Aircraft Noise in Eastern NC and Virginia

The Defense Department has increased and developed plans to further increase military flight training activities in eastern North Carolina and Virginia. The Oceana Naval Air Station became a Master Jet Base with the addition of F/A 18 aircraft strongly increasing the noise in the Virginia Beach area compared to the immediately preceding years. This resulted in lawsuits from many homeowners for which there is now a pending settlement. The Navy sees a need for an additional outlying landing field to take some load off Fentress Field in Chesapeake and is proposing a facility near the Pungo Lake part of Pocosin National Wildlife Refuge in Washington County which is has met resistance. Also, there was a proposal to create a new training route over the Lake Mattamuskeet National Wildlife Refuge in Hyde County. This proposal has been withdrawn as part of a settlement of a suit. Instead, military operations in the Core Banks area of Carteret County will be modified to allow jets to come in off the ocean at full speed when entering the Pamlico Sound operations area.