

A Newsletter from **Stewart Acoustical Consultants**

Our 29th Year

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Welcome Steve Stulgin

We are pleased to announce the addition of Steve Stulgin to our staff as acoustical analyst. Steve is a graduate of the acoustics program at Columbia College of Chicago, a student of professor and acoustical consultant Dominique Cheenne, Ph.D. This is a unique undergraduate program specifically designed to train students to work in acoustical consulting firms. While this program does not provide an engineering degree, it provides a concentrated set of courses in applied acoustics and noise. The program concentrates on building acoustics and environmental noise and Steve has strong interest in both areas. Steve is a native of the Chicago area and a golfer who looks forward to our milder winters.



And Goodbye Aaron

We regret to announce that Aaron Farbo will be leaving us in October to move to New England. We have been fortunate to have him with us and wish him well.

LEED for Schools

There is now a special LEED certification program for schools that offers points for achievements in good acoustics. The program is tied into the ANSI standards for classroom acoustics which is available free here. To qualify for the LEED certification, the school design must first meet the standard for reverberation time in the classroom. This is easily done by putting the ceiling at 9 feet and covering about 85% of it with an NRC 70 ceiling panel such as the ones available at low cost especially for classrooms. Higher ceilings require greater effort. The classrooms also must meet the requirements for STC 50 walls and floor-ceilings between classrooms and to the exterior. There are some important exceptions to the classroom acoustics standard that still allow the LEED certification: STC 35 windows can be used without limitation on the size, the floor-ceilings do not have to meet IIC requirements, and the HVAC and outside noise intrusion limit is 45 dBA which is quite loud for a critical listening environment. Additional points can be achieved by getting this down to 40 or 35 dBA, the objective in the standard. If the design achieves one of these lower levels in the classroom, then an additional point is available for getting playgrounds down to 55 dBA, and all other school grounds including playing fields down to 60 dBA. It is not clear exactly what these limits mean. It would be most reasonable to apply them to average levels measured without people present, but it leaves questions about whether loud areas immediately adjacent to roads would disqualify a site. Finally, an additional point can be achieved by requiring use of vacuum cleaners, carpet and rug cleaners, floor buffers, leaf blowers, and lawn mowers that produce less than 70 dBA and meet other non-acoustical requirements. It is not clear how the 70 dBA is to be measured.

Museum Exhibit

A special traveling exhibit on Sound is at the North Carolina Museum of Natural Science in Raleigh through September 16. [Wild Music](#) provides an introduction to sound, allows you to explore the soundscapes around us and the sounds of animals, and provides information on the research ongoing by several researchers. Schedule and admission information is available from [the museum website](#).

2007 ASHRAE Applications Guide – Sound and Vibration Control

ASHRAE updates its “Applications” guide containing the chapter on Sound and Vibration Control every 4 years and the 2007 edition is now available. ASHRAE members receive this volume and others can order the individual chapter on Sound and Vibration Control from the ASHRAE online bookstore. The most significant changes we have observed are a new treatment of plenums, a little better treatment of the relationship between sound power and the sound level in a room, some rearrangement to put all the discussion of sound criteria at one place, and some changes in the worked out example using NC instead of RC criteria.

Green Guide Credits for Health Care Facilities

The *Green Guide* has introduced a two-point credit (GGHC v2.2 Environmental Quality Credit 9) addressing acoustics in health care facilities. The credit references the 2006 AIA/AHA Draft Interim Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities and follows their organizational structure. The approach advocated by both the *Green Guide* and the AIA/AHA Guidelines favors acoustical control both at the source and in areas impacted by unwanted noise. The resulting design should, at a minimum, address the following categories: (1) Exterior Noise, (2) Acoustical Finishes, (3) Room Noise Levels, (4) Sound Isolation, (5) Paging & Call Systems, and (6) Building Vibration. For more information, register at www.gghc.com, log in, go to downloads, and look for the technical brief on acoustic environment.

Residential Sound Isolation – It’s in the Building Code

We continue to find architects unaware that minimum requirements for sound isolation between residences in multifamily structures are specified in the Building Code. See Section 1206 in the 2002 NC Code. This requires that walls and floor-ceiling structures between dwellings and other dwellings or public/service areas in the building must use designs expected to test at least STC 50 and for floor-ceilings IIC 50 in laboratory tests. Further, the design and construction must be such that results tested in the field after construction including any flanking present will not be more than 5 points less. Be careful in selecting designs based on limited test results since a given design will regularly give results over a range of +/- 2 dB and sometimes more in multiple tests. Some manufacturers publish the highest results ever obtained instead of representative expected results. Also, recognize that achieving the IIC results requires some kind of cushioning agent under hard floor surfaces and in the case of wood-frame structures, batts in the ceiling cavity and a good resilient mounting of the ceiling. Also, these code requirements must be viewed as minimums and not as desirable results. The acoustical design should be of a quality that matches the rest of the structure.

Specifying Sound Isolation – STC is not enough

While the STC of a wall is necessary information for the design of good isolation, the specification and achievement of such requires much more. Specifying STC does not assure good isolation. Isolation depends not only on the sound blockage ability of a partition but also control of sound getting around that partition (flanking), and the relative size of the partition and the amount of sound absorptive material in the spaces. The Noise Isolation Class, NIC, is easily measured in the field and gives an evaluation of the overall isolation actually perceived. Specifying STC alone also can lead to intentional or unintentional use of unrepresentative test results showing higher than expected performance. Designers should identify a wall design that is required after reviewing all available test data and the particular conditions of the project, and then specify the actual construction of the wall along with appropriate details to control flanking.

July issue of Sound and Vibration Magazine features local research on Violins

George Bissinger recently retired from the Physics faculty at East Carolina University and David Oliver of Polytec authored an article on **3-D Laser Vibrometry on Legendary Old Italian Violins**. According to the editors, “This absolutely delightful article presents state-of-the-art measurements on three “priceless” Italian violins in continuing attempts to discover the “secrets” of their legendary makers.”

Products Mentioned on our Website and in our Newsletter

Mentions of products in our Newsletter are not intended as general endorsements and are not paid advertisements. These are usually unique products available from only one supplier that meet special needs. Our intent is to make you aware of these new products. Suppliers with new or unique products should feel free to contact us.

Resilient Channel Sandwiches – a Recipe for Disaster

We continue to see problems where people have used resilient channel sandwiches, two layers of gypsum with only resilient channel between them. Some people see this as a way to improve an existing wall by adding resilient channel and another layer of gypsum over existing gypsum. Others find it in a catalog of fire-tested assemblies, especially ceilings. This type of assembly may be good for fire, but it is definitely not good for sound blockage. The problem is that the air space is so small that the resonant frequency due to spring of air and RC between the two masses of gypsum is in the range of around 200-300 Hz. This makes the assembly very weak in this range, weaker than it would be without the RC. As noted in the USG Gypsum Construction Handbook, this is “**not recommended when sound control is a major consideration.**”

Steel Studs – Light Gauge or Load Bearing – Big Difference

We are often called in on situations where walls with steel studs have not given the performance the designers expected. The common problem is that the designers have depended on data for “steel studs” but have used load-bearing heavy gauge steel studs. There are many tables of data for “steel studs” and even some original test reports that make no mention of the gauge of steel used for the studs. In almost all these cases, the data are based on 25 gauge studs. The gauge of the steel makes a major difference in the sound blocking ability of walls when the gypsum is attached directly to a single set of studs. The flexibility of a light 25 gauge studs reduces the structural transmission of sound through the stud. A heavy load-bearing stud will behave much like a wood stud. This difference is reduced when resilient channel is added. The difference is also minimal in double stud or staggered stud arrangements unless bracing is required between studs on each side of the wall. When such bracing is required, performance is deteriorated some with light gauge studs and strongly with heavy gauge studs.

Instrument Rentals

We often get calls from people who want to rent sound level meters or other instruments for the measurement and analysis of sound. We refer people to two good sources. Scantek, Inc. in Columbia, MD <http://www.scantekinc.com/rental.htm> is the US sales representative for several lines of instruments and also operates a fully accredited calibration laboratory. They are especially good for short term rentals with daily rates. The Modal Shop offers instruments primarily from Larson-Davis http://www.modalshop.com/test_rental.asp and has a 7 day minimum rental period.

UltraSteel Studs – a New Development

If you have not yet heard of it you will be hearing of “UltraSteel” studs. These have been used in other parts of the world and are now being rapidly phased in to the US market. UltraSteel refers to a light gauge stud made from steel that is actually lighter than the standard 25 gauge, but which have strength similar to 25 gauge and acoustical performance at least as good as 25 gauge studs. The studs have an embossed pattern on them that gives them extra strength with less steel. Advantages are use of less steel and reduced transportation costs. The code agencies have approved their use in all applications that otherwise call for 25 gauge studs. There are some claims that the UltraSteel studs are acoustically superior to the regular 25 gauge studs. Our position is that the data are still not sufficient to be sure of this, but they are at least as good. If you do some searching you may also find reference to a special drywall product that is being marketed with the “UltraSteel” name in conjunction with the introduction with the studs. Do not be confused as the studs can be used with regular gypsum.

Directionality of Transmission Loss, STC and ASTC

In theory, the transmission loss of a wall and the resulting STC or ASTC is a property of the wall independent of the direction of the sound transmission. Thus, the result should not vary with the direction of the measurement, or which room is used as the source or receiving room. However, we have long known that results vary from test to test in different labs or at different times. Now, it has also been observed that measurements in the same lab in different directions can often be different. ASTM E90, the standard for laboratory transmission loss measurement has been changed to allow labs to test in each direction and average results before computing the STC and reporting the results based on the average. This should result in a more reliable result when done this way. However, the standard does not require this bidirectional testing. A proposal has been made to modify the standard for field measurement (ASTM E336) to allow such bidirectional testing, but with a difference. The field standard would require the results in each direction to be reported individually but allow a result based on the average to also be reported.

Pioneers in Acoustical Sales in North Carolina

Many people have been involved in the sales of acoustical products in our area but a few distinguished themselves through their support of the acoustics community. In the 1960's Ed McKee with Lee Associates represented Bruel & Kjaer, the premier acoustical instrument company selling precision sound level meters. He became active in the NC Chapter of the Acoustical Society and its President. When he left for another career in the early 70's, he was succeeded by John Held. John had grown up in DC, but was in Massachusetts working for General Radio, the major US manufacturer of sound instrumentation. He took over and then bought out the NC territory of Lee Associates, expanding to carry a wide variety of both acoustical instrumentation and noise control materials, serving primarily the industrial markets. He became active in the Acoustical Society Chapter and was quickly elected President. He has been active ever since and still serves on the chapter board. John retired several years ago and his dedicated professional service is missed. John has a strong interest in railroads and model railroads. One of the major materials companies John represented was first Consolidated Kinetics, then Peabody Noise Control, and today is Kinetics Noise Control. While John served the industrial market, Ed and Allen Tudor set up Southern Kinetics representing these same companies to serve the architectural market. Ed was based in Raleigh, and Allen in Virginia. Ed was always referring his customers to acousticians for help and provided financial support to the acoustical society chapter though he was not active in it. Ed passed away several years ago and Allen continues to serve the southeastern Virginia area.