

A Newsletter from **Stewart Acoustical Consultants**
and **F.C.Schafer CONSULTING, L.L.C.**

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Making our World Sound Better Since 1979

Wishing you a Merry Christmas and a Happy New Year

Happy Holidays! – OFFICE HOLIDAY CLOSING NOTICE - Our physical office will be essentially closed December 22 – January 1 with limited ability to respond. Joe Bridger will be on vacation from 12/18/12 – 1/2/13, but key personnel will respond to emails to him through 12/21/12 COB, and on January 2nd. Please bear this in mind as you plan for the next few weeks and contact us immediately if you have needs that cannot wait until January.



CMC Center – Hyderabad, India - We are pleased to announce the completion of a major auditorium for CMC, a global information technologies company headquartered in Hyderabad, India. MMG Acoustical Consultants of Bangalore, India working in conjunction with Stewart Acoustical Consultants and F. C. Schafer Consulting provided consulting services for noise control and architectural acoustics along with design services for audio, video, performance lighting and theatrical rigging systems. The auditorium both supports the business with lecture and town hall type meetings and supports full musical, theatrical productions and cinema presentations. To accomplish this goal the noise level was kept low and the acoustics of the room were adjusted to accommodate both speech and music. The sound system is designed as a true left-center-right system with front fill speakers that provide sound reinforcement to those seated in the very front rows with ancillary systems providing sound to the back stage dressing rooms and to the main lobby areas. The sound and lighting systems are able to be operated either unattended, for meetings and other small events, or attended for larger events and theatrical productions. The result is a truly functional and versatile facility that supports the myriad number and type of events intended by CMC.

<i>Inside This Issue</i>	
Front Page: CMC Center in India, Holiday Hours	1
BIM-Green Buildings-Acoustics, Door Testing, Privacy, NCSU Reunion	2
HUD Noise Analyses, Steel Studs, Field Sound Isolation Measurements, NC OSHA, In Memoriam	3
From F C Schafer- Auralization, Acoustical Product News	4

BIM, Green Buildings, and Acoustics - Change is Coming – BIM is making possible things that were never possible before for designers and engineers. Several great articles have been written in the fields of room acoustics, HVAC noise control, and audio systems design about the need for better tools that work within the BIM framework. There are a few early attempts to write software that works with these tools. We are following this closely and will keep you informed, and hope to be involved in the development of such tools, ideally for designers and engineers, not just acousticians. If you are in the building design industry and would like to know how you can help, please email Joe Bridger at joe@sacnc.com for more details. One of the key concepts of sustainable buildings is an integrated design approach which BIM facilitates. The rise of acoustics in green buildings is very rapid with the adoption of many more building types with an acoustic credit in LEED v4 (not yet balloted but finished what is believed to be the last public comment period) and stronger prerequisites for schools. Of course we have discussed in the past the new green construction code. There are concerns about the LEED process in the current and previous versions. The green building movement has changed the practice and implementation of acoustics in buildings forever. Joe Bridger presented two invited papers at INTERNOISE 2012 discussing these things titled “LEED for Schools Acoustics: Case Studies and Critique of the Requirements, Submittal, and Approval Process” and “Green Acoustics - How Sustainable Design is Radically Changing Acoustics in Buildings.” Which you can download [here](#) via ShareFile.

Stewart chairs task group to write new ASTM standard for field tests of doors – For many years we have had to tell people that the testing of doors they wanted done in the field just could not be done, at least not to give a result that was clearly dependent on the performance of the door. People are faced with specifications written by people not really familiar with the ASTM standards who assume it is an easy and always possible matter to establish at least the Apparent STC of a door in the field. However, ASTM E336 does not provide a way to separate the performance of the door from that of the partition in which it is mounted, and in many cases corridors are too narrow, or rooms too small or too absorptive to allow even the apparent STC of the partition containing the door to be established. All that can be measured is the noise reduction and resulting Noise Isolation Class or NIC rating. Michel Morin, a consultant in Montreal has developed a method to measure the insertion loss of the door, giving a result which appears to come close to the transmission loss on which STC is based. Further evaluation tests are currently in process and a draft standard has been prepared. The hope is that the result of these tests which might be called Door Transmission Class could be used to compare to laboratory determined STC ratings of doors for field acceptance.

Privacy – It’s not just about sound blockage, background sound is essential – In the world of auditoriums, churches, and concert halls, the importance of a very quiet background sound is often emphasized. A room with exceptionally good room acoustics can be useless if the HVAC system is so noisy people cannot hear. On the other hand, rooms with mediocre room acoustics but extremely quiet HVAC systems are often praised for their “acoustics” just because people can hear well. On the other side of the coin in the world of offices or other spaces where isolation is the goal (and having a very quiet background is not), the role of the background sound is also important. However, now it is important that it NOT be too quiet. If it is so quiet you can hear the proverbial pin drop, you will. Privacy is really a signal to noise ratio effect. It is the combination of the sound reduction provided by the structure and room effects and the background sound. For each dB the background sound is lowered, the sound blockage must be improved by a dB to maintain a given degree of privacy. Architectural designs that work in one building do not in another because the background sound is lower. Historically, in older buildings the background sound was low, but the sound blockage from heavy masonry was good. With newer lightweight construction, more background sound is required to establish privacy. The levels of background sound acceptable in various circumstances are known. Failure to maintain adequate background sound consistent with the sound blockage provided is the leading cause of privacy complaints. Modern HVAC systems often produce variable, non-steady sound, making them unreliable for privacy. The use of electronic masking systems for controlled background sound is becoming essential in critical privacy situations.

NCSU Reunion – On September 29 Noral and Joe joined approximately 50 former students and faculty from the NCSU Sound and Vibration graduate program over the past 45 years for a reunion. Many of the students and faculty from the early years 30 to 40 years ago returned to this once in a lifetime event including former faculty Frank Hart, Larry Royster, Ron Bailey, Bill Reiter, and Tom Hodgson.

HUD Noise Analyses – Problems created by the less experienced – Whenever a project is to be financed by an agency of HUD, the noise on the site due to existing sources such as roads and railroads must be calculated, using methods specified by HUD, and if the noise is above certain limits the buildings must be evaluated and steps taken to reduce noise reaching the inside. This is a service provided by Stewart Acoustical Consultants. The basic calculation of exterior noise is relatively simple once all the needed data is obtained. Unfortunately, many people leave this step initially to people not highly experienced in environmental noise. If such initial studies indicate the need for analysis of the building, then we get the call. However, we find that we always have to repeat the initial calculations to determine the noise at the appropriate locations, and frequently, once we get the proper data and calculate the noise at the proper locations, we find that the buildings are actually in the “acceptable” range such that the building does not require special noise control steps or evaluation. The best practice is to start with a specialist in acoustics and noise control who is experienced with HUD projects and can do the job right from the beginning.

Steel Studs – They are not all created equal – Warning on 20 gauge studs – We commonly see drawings and designs where steel studs are used with expectations of high STC performance. Many data sources will show high STC ratings of partitions identified as having “steel” or “metal” studs. However, what they do not tell you is that those tests were conducted with 25 gauge studs. Steel studs that are 20 gauge or heavier as commonly used will not come close to that performance. In fact for such studs the performance is comparable to wood studs. A common partition with 5/8 inch gypsum on each side and batts in the cavity is around STC 47 with 25 gauge studs but just STC 40 with 20 gauge studs. Problems are being found where people have used 20 gauge studs with expectations of the performance of 25 gauge studs. To get that performance with the heavier studs it is necessary to use a resilient channel on one side of the studs.

Field Sound Isolation Measurements – Many years ago ASTM created the standard E336 as a method to measure isolation between rooms and in limited cases to measure the sound insulation of partitions and floor-ceilings in the field. These early measurements of actual partition performance were intended to be reasonably comparable to laboratory results. Stringent requirements on room size and absorption were established, and there was a requirement to prove that flanking was not significant. The result was called the Field STC or FSTC. However, the conditions required to properly do this measurement in the field rarely existed, and the required conditions were widely ignored. This created a mistaken impression that the FSTC could always be measured. People wrote requirements in specifications that it be measured where it could not be. In an effort to partially remedy this situation, in 2005, the Apparent STC or ASTC was introduced. This relaxed the requirements for room size and absorption some, and fully recognized that flanking was present. The ASTC can be measured between almost any pair of rooms that are in the range of 25 to 150 m³ in volume with no dimension less than 2.3 m. If a room is greater than 150 m³, the ASTC can be measured if it can be shown that the absorption in the room is within a limit related to the room size. This allows many opportunities to measure ASTC, but still rules out most corridors or large rooms that have carpet or acoustical ceilings. Alternatively, the basic isolation between rooms, the noise isolation class or NIC can always be measured between two spaces and provides an overall direct indication of the isolation between the spaces that is more appropriate in evaluating what is actually heard. This simpler test is a better alternative for specifications of field performance, but the specifications should indicate whether rooms are to be furnished or unfurnished during testing since that will influence results.

NC OSHA Noise Control – For the past 15 years since 1997, we have seen relatively few citations for failure to implement feasible noise controls from the NC OSHA agency. In 2012 we have seen a flurry of activity. We do not know if this is just what we are seeing or if it is an indication of increased activity and emphasis on noise control by NC OSHA.

In Memoriam – We remember some leading acousticians and some favorite architectural clients we have lost.

Harvey Hubbard – Pioneer in aviation noise and director of the NASA Langley Acoustics Branch where Dr. Stewart got his start in acoustics in the summer of 67.

Richard Campbell – developed the communication system for the NASA Gemini and Apollo programs.

Maa Da You – father of acoustics in China, classmate of Leo Beranek at Harvard.

Henry Shriver – Architect of Norfolk, Virginia, designer of Virginia Tech Architectural facilities, Norfolk Airport, Douglas Wilder Center for Performing Arts.

Jimmy Edwards – Architect of Raleigh.

Owen Smith – Architect of Raleigh.

Fred Schafer – updates from **F.C.Schafer** CONSULTING, L.L.C.

Auralization – Useful Tool or Just another Marketing Buzz Word? - Auralization makes it possible to listen to the character of sound signals generated by a sound source and modified by reinforcement, propagation and transmission in systems such as rooms, buildings, vehicles or other technical devices.

While the current definition of auralization is the technique of creating and reproducing sound on the basis of computer data, auralization is not new. In the past auralization was created using a physical scale model and recording a sound source that was scaled in frequency to match the dimensions of the model. This was a time intensive and costly process that was relegated to primarily high end concert halls. With the advent of high speed, multi-core computers and computer software designed to deal with complex acoustical calculations the necessity to create a physical model of a space was replaced with the ability to create a virtual computer model of that same space. It is possible with today's acoustical software to either manually in the case of a drawing, or using an import function in the case of a CAD or Sketch-up file build a virtual acoustical computer model of the area of interest in a much shorter time than to create a comparable physical scale model. Following the construction of the virtual acoustical model, the designation of materials for each surface in the model is completed and acoustical calculations undertaken. Once this initial acoustical work is finalized the compiling of a computer based auralization becomes beneficial.

Auralization is like using a rendering. We know a rendering is not a photo, and in the same fashion an auralization is also only an approximation of what we may hear in the real space based on the data in the acoustical model and the math used to create that approximation. Auralization is particularly beneficial when comparing two different acoustical conditions. An example of this would be the acoustical difference in an arena with the recommended acoustical roof deck versus a standard, non-acoustical, roof deck as may have been recommended for purposes of value engineering. Having the ability to hear the difference in both the acoustical quality and speech intelligibility between two building configurations like this has proven to be exceedingly beneficial for numerous projects. There are numerous other comparison examples ranging from acoustical treatment or sound system configurations for houses of worship, theaters, auditoriums, stadiums, classrooms or areas that must have intelligible speech for emergency communication or mass notification announcements.

Acoustical Product News

Certainteed and TempleInland enter damped gypsum market – Two new entries are now available in the damped gypsum marketplace joining QuietRock, National Gypsum Soundbreak, and Supress Products. Certainteed in cooperation with Green Glue and introduced a line called [SilentFX](#), and TempleInland has a product called [ComfortGuard](#). All these products are relatively new. They appear to provide significant benefit especially in cases where the gypsum is applied directly to wood or heavy gauge steel studs. The various companies have tested many different assemblies, but usually there is only one test of each assembly and as would be expected in some cases the results are inconsistent. This basically is indicating that some of the test results are either better or worse than what the typical result will be with many tests. Now that there are several suppliers, it may be possible to compile the results from all and get a better idea of typical expected results, but this could be complicated by actual variations among the products.

Hufcor Summit Vertical Operable Partitions – As seen on this [youtube video link](#), Hufcor is giving Skyfold a run for its market share with the [Summit 640V](#). This vertical stacking system requires a much narrower slot. Of course as with all operable partitions they test well in the lab. Skyfold has made a name for itself in the acoustics community because they maintain their rating in the field much better (less than 5 points difference) compared to most operable partitions which are about 10 points lower measured in the field than their lab tests. We have some hope that the automatic and vertical stacking nature of this product will provide the consistency of application and pressure on the seals at the joints to also provide a better field test rating. We look forward to receiving evidence from Hufcor and fellow consultants of its field performance.

KFlex Duct Liner Gray – We have previously discussed closed cell duct liner materials such as [Armaflex AP](#) made here in North Carolina. We have now learned of another local company making a similar duct liner material Kflex USA in Youngsville. Like other products, their [KFlex Duct Liner Gray](#) uses a resonant effect to produce absorption that is strong in a particular frequency region that is dependent on thickness. It is not a direct substitute for fiberglass duct liner. It will give different performance and could take greater lengths for comparable performance dependent on the frequency of the fan noise. However, these materials are useful tools to have available and also offer the advantage of improved breakout sound prevention.