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ACENTECH'S EXPERIENCE WITH STUDENTS

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ABSTRACT

Professional acoustical consulting rests on both technical skills and the communication of those skills to clients and potential clients. Effective communication requires strong oral and written presentation capabilities, and the use of audio-visual and other media aids, depending on the consulting or marketing task at hand. We report here on the relevancy and progress in education as it relates to building noise and vibration control based on the perspective of our firm's 50 years of acoustical consulting practice. The teaching experiences of our staff at primary through post-graduate schools, as well as at client facilities are considered. Illuminating suggestions and recommendations for both preparatory and on-the-job education are included from our younger staff consultants just beginning their careers.

1 - INTRODUCTION

More than fifty years ago, Acentech's parent company, BBN, started providing consulting services in architectural acoustics. We are still at it today, serving architects and building owners for performance spaces, offices, conference rooms, libraries, museums, hospitals, transportation terminals, sports facilities, and industrial facilities. Every project we consult on brings with it the responsibility not only to address specific project requirements, but also to inform our client about acoustics or noise and vibration control and the role they play in project design.

Perhaps not all, but many architects today have at least some understanding of the importance of acoustics for the occupants of the new buildings being built and the older buildings being renovated. Fifty years ago, architectural acoustics in the U.S. was seldom a subject available to students. One early course in architectural acoustics was taught by Bob Newman at MIT School of Architecture. Carl Rosenberg of Acentech continues teaching of that course at MIT as well as several other colleges and universities. Today, an increasing number of schools of architecture and engineering schools offer at least a half-semester course in acoustics. An increasing number of technical schools today offer a series of courses or programs in acoustics, some leading to advanced degrees in acoustics.

Some of our clients hire us to plan and teach courses in acoustics that are tailored to their specific needs. These courses generally last between one to three days, are relatively intensive, are taught at the clients facility, and are attended by on-staff facility engineers, planners, architects, and environmental engineers. Our experience with acoustics project consulting can be a useful adjunct to more academic approaches to instruction available elsewhere.

In addition to teaching in a consulting or classroom setting, our staff also write and contribute to textbooks and other teaching aids. For example, McGraw-Hill has recently published what may be the first professional CD-ROM on the subject of architectural acoustics. We believe that it is outstanding. It was prepared by Jim Cowan with sponsorship by the American Institute of Architects. For more information, see <http://www.acentech.com/AcouCD.shtml>. It addresses a range of materials used in acoustical applications, sound absorption, transmission loss, noise barriers, noise control, reverberation, sound isolation, and acoustical privacy. It includes examples of a wide range of spaces from concert halls and offices to schools and residences. The CD includes numerous animations and audio samples that highlight various examples of the principles of architectural acoustics.

2 - STUDENTS AT ACENTECH

Northeastern University in Boston (and many other universities) offer a co-op program in their engineering school where students attend school for two semesters and work for one semester each year for five years. We often hire one of their co-op students to work at Acentech for a semester while they are getting their education. This provides us with the opportunity to work closely with young eager students, to provide them with some instruction in basic acoustics and consulting, and to possibly hire them as full-time employees following their graduation.

Recent graduates work full-time at Acentech as junior consultants. They spend a large portion of their time working on projects closely with one or two senior consultants on a wide variety of projects. New consultants have the opportunity to work not only on architectural acoustics projects, but also on audio-visual, environmental, noise and vibration, industrial projects, and flow modeling projects. We believe that this wide range of project opportunities accelerates their learning and helps them to choose their career paths. It also, of course, provides our senior staff with bright young assistants and helps Acentech "get the job done" economically for our many clients.

We often hire recent graduates with degrees in physics, music, and mechanical, environmental, or electrical engineering. It is our experience at Acentech that when hiring recent graduates, we are best served by hiring those with bachelor's or master's degrees that include considerable course content in acoustics. Those students have, before coming to work, shown a considerable interest in and have made a significant commitment to acoustics.

New employees at Acentech are provided the opportunity to attend courses in acoustics taught by other consulting firms. Examples include transportation noise modeling courses taught by HMMH located on Burlington, Massachusetts and the Noise Control for Buildings and Manufacturing Plants course taught by Hoover – Keith located in Houston, Texas, previously taught by Laymon Miller while he was at BBN. Clearly most educational institutions today are doing an effective job of teaching and encouraging computer literacy. Our young employees normally come to us with considerable interest in using computers and computer modeling. This has been particularly helpful to our older senior consultants, some of whom are a bit hesitant to incorporate advanced computer analysis methods and modeling. We keep up with the rapid advances being made in computer modeling and drafting, computer data bases, geographic information systems, company-wide rapid internet access, electronic exchange of technical information with our clients, and electronic communications between our offices largely due to the enthusiasm and efforts of our younger employees.

Consulting often requires effectively communicating complex technical concepts and conclusions to laypersons. Clear and concise writing skills are, of course, of great importance for good communication between consultants and clients. It is most unfortunate that some engineering schools, from which Acentech draws the majority of its younger staff, have little or no required training in the communication arts. Some of our staff report that it is possible to obtain a master's degree in engineering without having so much as one creative or technical writing course. Consequently we offer in-house training courses in technical writing. Likewise, few engineering schools require any coursework in public speaking. We often encourage our staff to attend post-graduate courses in public speaking. Generally, almost all schools do offer at least elective courses in communications, and students considering consulting as a career would benefit greatly from taking these courses. In fact, we strongly believe that training in *all* technical disciplines should require at least introductory courses in technical writing and speaking, whether or not the student is specifically preparing for consulting.

Although much of our work at Acentech in architectural acoustics is performed by those with architecture or architectural engineering backgrounds, some is done by staff with musical, physics, and electrical or mechanical engineering. Few of the latter arrive with skills in reading or working with architectural drawings, or possess an elementary working architectural vocabulary. We would counsel such students considering consulting in architectural acoustics to seek out available elective courses in associated schools of architecture.

An inverse problem rests in the curriculum of many schools of architecture – lack of any significant training in acoustics and noise control. We often say at Acentech "an educated client is a good client." "Educated" in this context refers to sensitivity and general familiarity with acoustical issues, not necessarily a detailed knowledge of acoustical design. A single effective course in architectural acoustics can go a long way toward developing this sensitivity. We believe it has a place in every quality architectural curriculum, not just those where acoustics is a specialty discipline.

As a side note, several of our staff spend time at their local primary or elementary schools helping the science teacher explain acoustics to young students. The young students generally enjoy and look forward to guest speakers and the subject of acoustics offers many interesting opportunities for hands-on (ears-on)

experiments. It has been my experience that noisy experiments with plenty of student participation and data taking are far preferred to lectures about decibels (decibels are a boring concept to most children)! This involvement with the education of young students is particularly rewarding for our consultants who take the time to do so. It is also fun – we recommend it highly! In the primary school classroom, we have the chance to enhance people's basic understanding of sound and acoustics. We might even encourage a student or two to study acoustics when they attend college and perhaps enter and contribute to our profession.

3 - INCE FOUNDATION

The INCE Foundation of INCE/USA, founded in 1993, supports education in acoustics by providing encouragement to excel, well-earned international recognition, and cash awards to outstanding students and educators in the field of acoustics. Awards are made annually at INCE meetings, the most recent was during InterNoise 1999 in Fort Lauderdale, Florida where many student projects were superior.

The Foundation supports the Student Paper Prize Competition, the INCE Outstanding Educator Award, and the INCE Award for Excellence in Noise Control Engineering.

While not limited to the subject of architectural acoustics, the INCE Foundation provides to each of us who devote our careers to acoustics with a way to help to ensure that today's most outstanding students, authors, and their hard-working teachers are well recognized for their efforts by our professional society. These are the folks who will provide future leadership in the field of noise control and will continue applying and improving upon the applications of our profession. I encourage the teachers of acoustics to inform their students about the INCE Foundation and to help their students with projects that are worthy of submission to the Foundation for consideration of an award. More information is available through the internet at the Foundation web site <http://users.aol.com/foundince/if.html>.

Let me take this opportunity to ask that you, as a member or friend of INCE, consider making a financial contribution to the INCE Foundation. The tax-exempt foundation relies on cash contributions from each of us to support the cash awards it makes to students and educators. Contributions are an excellent way for your organization to establish credibility among students and potential future employees. With your help we will continue to invest in the future by providing support and encouragement to educators and students of acoustics.

4 - ROBERT BRADFORD NEWMAN STUDENT AWARD FUND / SCHULTZ GRANT

In memory of Bob Newman, one of our mentors and a friend, colleague, and world-renowned educator and consultant in architectural acoustics and noise control, the Robert Bradford Newman Student Award Fund has for 15 years recognized outstanding students and provided financial support and a medal "For Merit in Architectural Acoustics". This year's recipients are from the Massachusetts Institute of Technology, Roger Williams University, and The University of Kansas. Subjects of the awards during 1999 were: "Optimal Design of Acoustical Elements of HVAC Systems", "Acoustical Analysis: The New Padanarum Summer Playhouse", "Audiooptimization: Goal-Based Acoustic Design", and "Preparation of Text and Illustrations for Booklet on Classroom Acoustics".

This year, the Newman Student Award Fund plans to also award its fifth grant for teachers and researchers developing improved teaching methods and curricula for education in architectural acoustics. This grant is named in honor of Theodore (Ted) John Schultz, another distinguished colleague and architectural acoustician. Several teaching aids have been developed by past recipients of the Schultz Grants, including: "Demonstrations of Basic Acoustical Principles Using Scale Models", "An Appreciation of Acoustics", "Architectural Acoustics Workbook", "Acoustical History of Theaters and Concert halls", and "Sound System Design Guide".

Requests for information about the Newman Student Award Fund, the Schultz Grant, and these teaching aids can be sent to P.O. Box 6349, Lincoln, MA USA 01773. We encourage you or your organization to send a contribution to the Newman Student Award Fund to provide ongoing support, recognition, and encouragement for the educators and students of architectural acoustics. The future of our profession is in their hands.