



# THORBURN ASSOCIATES

ACOUSTIC AND AUDIOVISUAL CONSULTANTS

eNEWSLETTER November 2004

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**1. Greetings**

Welcome to the November 2004 issue of our eNEWSLETTER. The fall has slipped by fast this year. Over the last two months we have made a number of presentations to different groups, most recently at the AIA California Council Desert Practice Conference on "Acoustical Chaos" and at the AIA Virginia Conference on "Technology for Houses of Worship". The Acoustical Chaos presentation addressed recent changes that HIPAA, the ANSI classroom acoustics standard, and Sustainable Design have placed on us as acoustical engineers. The Technology for Houses of Worship discussed how technology could be used to assist in the worship service. Both sessions are AIA approved for CEU. If you think either of these would be useful to your team let us know, they can be done as a lunch and learn.

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.

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**2. The Themed Entertainment Association has changed its Name and Thorburn Named to the TEA International Board of Directors.**

The TEA (formerly Themed Entertainment Association) launched a new logo design and shortened its name to better project its membership and services to an increasingly diversified client base. "Our new logo graphically presents our members' expertise in themed entertainment and experience design with a fresh, clean, professional look that will have greater appeal to museums, heritage facilities, science centers, corporate brand centers, and a host of new client categories," said TEA International Board President Pat Gallegos about the new logo. Stimulated by the 2003-2005 Strategic Plan for the association, the nearly year-long logo development process involved input from a number of TEA member design firms and many review and discussion sessions with the entire International Board. "The new TEA logo is only the first of many steps the association will be taking in the years to come to raise awareness of the organization and to better market and promote the skills, expertise and experience of all our members."

Also At the annual meeting of TEA in Orlando this month (18 November 2004) Steven J. Thorburn, PE, CTS-D, CTS-I was among the 6 individuals elected to the International Board of Directors. Steve made the following statement on his acceptance of his nomination:

"To me, the TEA is in a transition phase moving from adolescence into adulthood. The goals of the TEA Founders are being challenged and need to be reviewed. Member benefits need to be updated; I can remember the benefits of the lectures and presentations on ways to improve our business and our educational outreach. I am looking forward to helping the TEA continue its growth."

Way to go Steve!



### 3. Variable Acoustics

Modern halls and churches come in all shapes and sizes, and the push for these spaces to be multi-purpose spaces creates acoustical challenges. From music requiring long reverberation times, to dramatic performances that require greater articulation and ambient warmth, a venue must often accommodate performances with conflicting acoustical requirements such as music versus drama. The acoustic properties of a space depend on its reverberation time, volume and the physical makeup of the space. If a space is reverberant enough for classical music, intelligibility and localization of the spoken word can be compromised.

In the past this issue has been addressed in a number of ways. The most common way is that the room is designed to its longest reverberant quality (typically for music) and then the room has sound absorptive banners or panels added to shorten the reverberation time for speech based events. While this can work well, it requires a fair amount of time to adjust a large room and does not allow for a performance venue to be "quickly turned" from one type of event to another.

With electronic enhancement, the acoustic performance of a venue can be very quickly altered to best suit the event. An electronic acoustic enhancement system can be an effective means of resolving sound quality challenges in ways that traditional architecture can't easily accomplish, the drawback is the cost. To appreciate the complexity of the system and the cost we must look at the "electronic architecture" of these systems.

The electronic enhancement works just the opposite of architectural adjustments. In the case of the room that is architecturally adjusted we start with a "live" room and shorten the reverberation time; for the electronic room we start with a room with a short reverberation time and then liven it up electronically. To liven a room up electronically we need to locate a large number of loudspeakers around the space, the bigger the space the more loudspeakers. Each of these loudspeakers usually needs its own acoustical signal shaping processor (DSP – digital signal processing) and its own power amplifier. The goal is that each loudspeaker needs to simulate the sound field that would have been reflected off a surface into your ear.

When you think about the last great sounding room you were in, there were many, many surfaces that reflected sound into your ear. The more loudspeakers the better the enhancement, the more expensive the system.

Four systems that we would consider when designing a space using variable acoustics come from:

#### **LARES ASSOCIATES**

The maker of the Lexicon Acoustic Reverberation Enhancement System is located in the Boston area. LARES began as a Lexicon product. The system uses a time-varying technique to shift the output in time enough to maintain stability but not enough to introduce tonal coloration.

#### **LEVEL CONTROL SYSTEMS**

Based in Sierra Madre, California, and Western Canada, LCS makes the Variable Room Acoustics System. VRAS. The VRAS system acts similarly in acoustically coupled spaces. The processing hardware is the LCS matrix system with an interface written in the BeOS operating system.

#### **ACOUSTIC CONTROL SYSTEMS**

Based in Garderen, Netherlands, the ACS system uses a large number of microphones "typically 12 or more" in microphones arrays. The arrays create specific coverage patterns for the input side of the system. The ASC hardware system is based on a card-cage configuration.



## SYSTEM FOR IMPROVED ACOUSTIC PERFORMANCE

SIAP, developed by SIAP B.V. at Uden, Netherlands, typically positions microphones close to the source of the performance (within 26 to 32 feet). SIAP offers only enough energy to make up deficiencies in the natural sound. The hardware system is a remotely controlled card-cage configuration.

So the short answer is yes we can change the acoustical feel of a space very quickly but does the project have the budget.

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### 4. Music and the Healing Process

This topic recently came up during one of our presentations where we discussed the acoustical issues of HIPAA and Hospitals. As architects and designers look at the negative impact of excess noise within patient areas, researchers are studying the positive impact of music on the healing process.

The power of music to affect emotions is well known. The right background music adds emotive punch to movies and TV shows (and even lets us know when the villain is near!) Pioneering work in 1991 by John A. Sloboda of Keele University in England revealed that more than 80 percent of sampled adults reported physical responses to music, including thrills, laughter or tears. In a 1997 study by Carol L. Krumhansl of Cornell University, heart rate, blood pressure, respiration and other physiological measures were recorded during the presentation of various musical pieces that were considered to express happiness, sadness, fear, or tension. While the physiological changes are different for each style of music, the changes were consistent across all subjects.

There is also significant research that music can be used in medicine to help manage pain, reduce anxiety and even decrease the time premature babies spend in neonatal units. Studies using music with premature babies have shown a 3- to 5-day earlier discharge from the neonatal intensive care unit (NICU) (Caine 1991, Coleman, Pratt & Abel, 1996, Standley, 1996). Apparently the addition of music masks the louder sounds from alarms and equipment within the NICU, helps calm the premature baby, promotes more time in sleep, and has a beneficial effect on their growth and development. In addition, we appear to be born with our appreciation of music. A recent study by Sandra Trehab at the University of Toronto showed that babies as young as two months will turn toward consonant (pleasant) sounds and away from dissonant (unpleasant) sounds.

The November 2004 issue of Scientific American includes an article by Norman M. Weinberger on "Music and the Brain", which looks at what actually happens in the brains of listeners and musicians. When a person listens to music, the brain's response involves a number of regions outside the auditory cortex, including areas normally involved in other kinds of thinking. A person's visual, tactile, and emotional experiences all affect where the brain processes music. Overall, findings to date indicate that music has a biological basis and that the brain has a functional organization for music.

The long and the short of all of this is that music surrounds us, is important to us, and has a multifaceted impact on us. It can make us laugh or cry. It can reduce stress. It can even help us heal.

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### 5. Paradise Park Wins Best FEC (Family Entertainment Center) Award

#### Way to go Team!

**Designed and Produced by White Hutchinson Leisure & Learning Group, Randy White**

**Architect: Finkle/Williams, David Williams**

**Acoustical Engineer: Thorburn Associates, Steve, Tyler and Katherina**



Paradise Park in Kansas City, Missouri, the family entertainment and children's edutainment center wins the Golden Token Award as the best new/renovated family entertainment center by the International Association for the Leisure & Entertainment Industries (IALEI) at its annual FunExpo convention in Las Vegas, Nevada, on Sept. 30, 2004. The award is given each year to recognize design excellence in the family entertainment center industry, which includes over 20,000 facilities worldwide.

Paradise Park is a 38,000-square-foot indoor and outdoor combination family entertainment center and children's edutainment center. The family entertainment portion opened in late November 2003 and the children's edutainment (play & discovery) center opened in February 2004. The edutainment center takes up about half the first floor and also includes a half-acre outdoor adventure play garden. The 2nd floor contains six birthday party rooms and a meeting room that is shared by both the edutainment and family entertainment centers.

Randy White who is CEO of Kansas City based White Hutchinson Leisure & Learning Group said, "We and the Ellis's, the owners of Paradise Park, are proud the project is receiving this recognition as the best new project in the industry. Over the years, many of our projects throughout the world have received recognition and awards, but it is especially gratifying when we are able to bring one to our own hometown."

Thorburn Associates, Inc was instrumental in mitigating the noise from the go-kart track at the adjacent residential lot line, as well as providing recommendations for sound isolation and room acoustics within the game rooms, birthday rooms and learning stations with in the park.

More information can be found at <http://www.whitehutchinson.com> and <http://www.paradise-park.com>

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## 6. Sleigh AeroNautical Test Area Laboratories Project Update

Thorburn Associates has been commissioned to assist Kris Kringle with a very unique project this holiday season. Due to the ever-increasing population of children worldwide, Santa has outfitted his sleigh with jet engines to enable him to reach more children in less time. The elves working in the SANTA (Sleigh AeroNautical Test Area) Laboratories chose dual Rolls Royce V2500 series jet engines for the retrofit. Though producing plenty of thrust, these engines also produce over 140 decibels at the driver's seat. Not only would this have violated most SAA (Sleigh Aviation Association) regulations for interior noise levels of the children's residences, the excessive sound levels would wake the kiddies.

To address these issues an Active Noise Control System has been designed. Active noise control involves sensing the offending noise and then producing a sound that cancels out the offending noise ("Anti-noise" as it is sometimes called). This particular design utilizes an array of microphones, sensors that collect thrust and operational data from the engines, digital signal processors, amplifiers and loudspeakers to produce the Anti-noise.

The system is currently undergoing test flight trials and is anticipated to be released for the official maiden voyage sometime in late December. The duration of the maiden voyage is still in question; the exact length will depend on the final good vs. bad count. TA would like to thank the Sleigh AeroNautical Test Area Laboratories, for allowing us to share this exciting issue with you.

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