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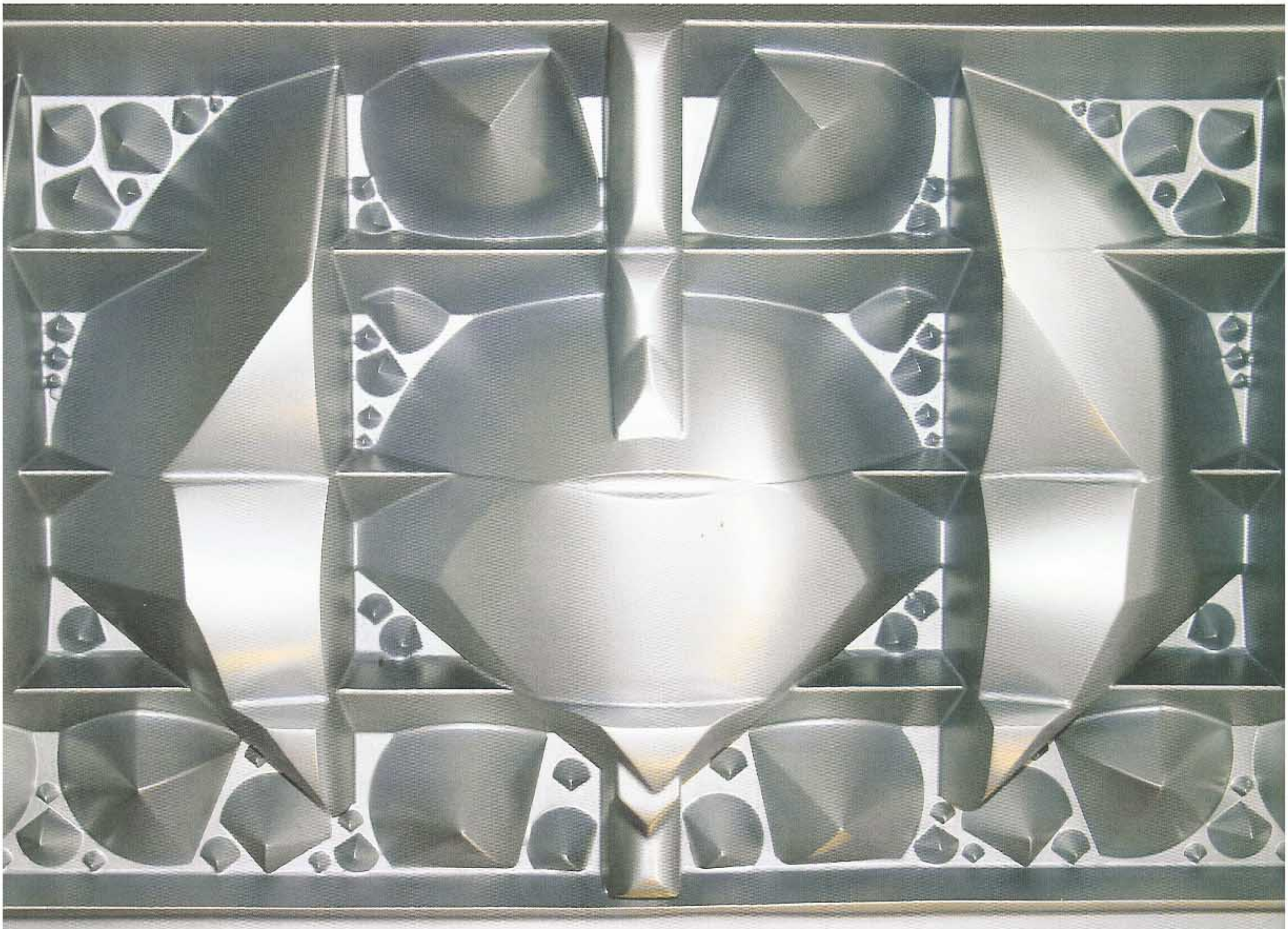

PHOTO BY MATT AUSTERMANN, CAM MAGAZINE

Invention Promises a New Golden Age of ACOUSTICS

By Mary E. Kremposky, Associate Editor

Stepping into the studio control room of Wayne State University's Department of Music is like stumbling onto the deck of a federation star ship straight out of Star Trek. Silver panels studded with an ordered array of half- and full-sized cones jut from every wall surface and the ceiling itself. Indeed, these panels not only look futuristic, they may be pointing to the future of state-of-the-art acoustical control. Doug Magyari, president of Pleasant Ridge-based Golden Acoustics, LLC and the private inventor of this revolutionary approach to acoustical control, has boldly gone where no man has gone before in unveiling the first installation of its type in the world.

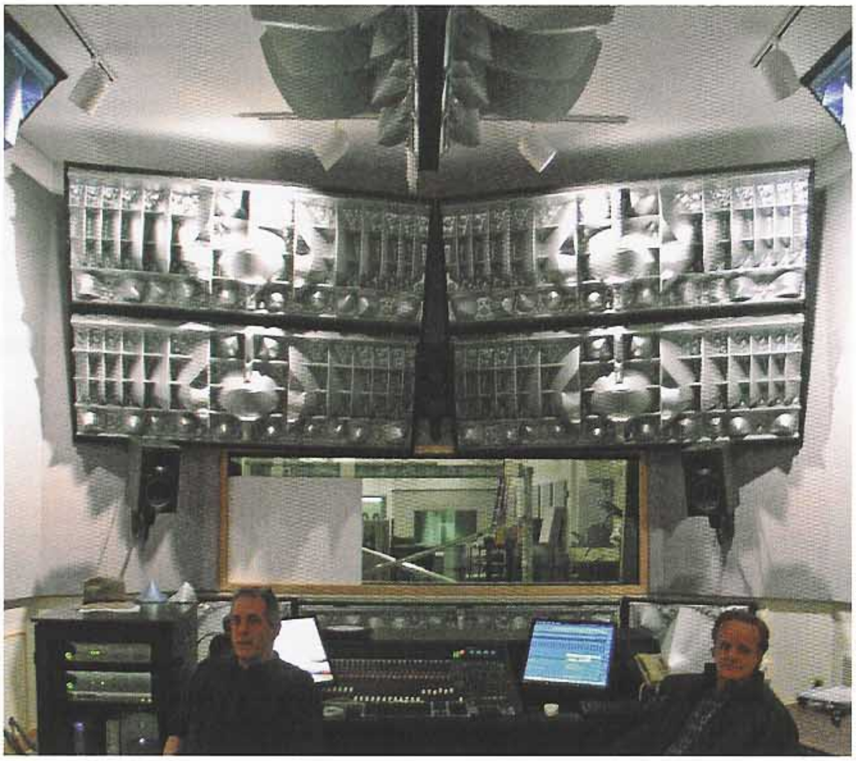
PHOTO COURTESY OF GOLDEN ACOUSTICS

Thomas Court, co-director of WSU's Music Technology Program (left), and Doug Magyari, president of Golden Acoustics, LLC (right), enjoy the unmatched clarity and acoustical control generated by Magyari's revolutionary sonic equalizer panels first installed at WSU.

Intricate mathematical equations dictate the shape, size and position of these silver-painted cones of polymerized reinforced gypsum. Many couldn't "do the math" but all can enjoy the extreme clarity and the easy, natural and comfortable sound produced. An array of these sonic equalizer panels remedied the distorted, blurred sound afflicting WSU's studio control room. The same panels may soon solve the sound dilemmas of high school auditoriums, churches, recording studios, restaurants, and industrial facilities in Michigan and throughout the country.

In May 2005, an expert team began studies of the sonic equalizer panels for the architectural community as a step on the road to converting the panels into a spec product. The team includes Golden Acoustics, the University of Michigan, Meyer Sound Laboratories, Inc., widely respected acoustical testing specialists based in Berkeley, California, and Chicago-based Riverbank Laboratories – the first and oldest acoustics lab in the world.

The resulting specifications will direct the use of the fourteen different products in the Golden Acoustics line. "They (the architects) will be able to look at a space, and given its size and design function, they will know how many and where to place these panels," said Magyari, a 30-year veteran of the sound and acoustics field. "I hope we will have publishable data by June 2005."

The story begins with Magyari's struggle to design and construct a state-of-the-art studio by banishing the sound signature or imprint of the room itself to arrive at an accurate representation of the music's original sound. The level of acoustical performance he craved was not to be found. As a private inventor with a background in physics, mechanical engineering, and chemistry, he decided to invent it himself. In 1999, he embarked on a five-year journey to develop the theoretical basis of this innovative acoustical control technology.

In attendance at the open house of the WSU Department of Music, he listened carefully to the acoustical concerns of his long-time colleague in the recording business, Thomas Court, co-director of WSU's Music Technology Program. Court agreed to use his beleaguered control room as the guinea pig for the new technology. As a result, the confines of a small room in WSU's Old Main now house the first installation of this technology that promises to spread throughout the country.

HEARING A CLEARER DRUMMER

At WSU, the buildup of low frequency sound in the Department's studio control room made it impossible for the sound engineer or mixer to hear the music with any degree of accuracy. Used for mixing music and productions, the studio control room is basically an assembly room for sound, explained Magyari. The mixer "assembles a song" by piecing together and balancing a variety of separate tracks that may include a vocal track, a guitar track, an electric bass, and a drum track. At WSU, the control room itself was blurring the sound with a constant buildup of low frequency wavelengths.

The sound of vocals and musical instrumentation coming into the room from the speakers was muffled and indistinct, definitely yielding an acoustic condition inaccurate for proper mixing and fatiguing to the mixer's ear. Adjusting the sound to the room conditions was like trying to hit a moving target. "The low frequency sounds were additively building up all the time," said Court. "We'd start at one point in time and two hours later the perception would be slightly different. We would be constantly trying to correct for this anomaly, but to coin a phrase from Star Trek, 'resistance was futile.' In this case, EQ-ing was futile, EQ-ing being equalizing or tone controls for balancing out the different instruments." Mixing in this sound-distorted chamber was akin to reading a book in a dimly lit room with the wrong prescription eyeglasses. Once installed, Golden Acoustic's sonic equalizer panels brought extreme clarity to the blurred or indistinct sound. "The sounds in the room became crisp, sharp, and articulate," said Magyari. "Now when they want to do a mix, they hear the voice exactly as it was recorded, they hear the drum tone the way it really is, and how it blends together with the keyboard track, for example. Before, they actually had to go somewhere else to mix the recorded sounds."

SWEET – CAREFULLY CALCULATED - MUSIC

Golden Acoustics' sonic equalizer panels are based on the cone, one of nature's most ideal geometric forms. "A conical form reflects sound in a non-linear, non-uniform manner, because its radius is changing over its height," according to information supplied by Golden Acoustics. "Our sound designers have taken the cone shape and split it in half vertically. Then one half is split in half again. This quartered section is inverted, mated to itself, and then reattached to the half cone, on its side."

Basically, the cone-shaped panels break the force of strong sound reflections into minute, scattered reflections without sufficient power to re-accumulate or re-establish their ingrained trajectories. Mathematical calculations govern the shape and proportion of each cone component "to optimize the diffusing of sound waves in the most efficient manner possible," according to information supplied by Golden Acoustics. The diffused or redirected energy then brings the sound to life but maintains an exacting clarity.

Two analogies help explain the end result. "Like a billiard table, the wavelengths can no longer reflect back and forth and become accumulative in their behavior," said Court. Like a breakwater in a harbor, the cone-studded panels break the force of the large waves, "by splitting it into small, manageable waves that protect the harbor," Court added. Compared to the open water, the harbor becomes a calm sea of sound easily navigated and managed by all ships.

The separate panels are sized and positioned to solve the problems of a specific room, allowing the designer to sharpen blurred sound like an optometrist selecting the proper strength of lens for each person. Each panel contains cone-shaped pieces of different sizes installed to handle different corresponding wavelengths.

"A long, low frequency wavelength of sound can be over 40 feet long," said Magyari. "The higher frequencies become smaller and smaller and can reach down to about a half-an-inch."

In WSU's studio control room, the panels are positioned and the cones sized to break low-end, bass buildup. The most massive cones are placed in the corners of the room to break the force of the low-frequency waves. Magyari explains: "The sound wave actually finds a perfect fit. It just cycles or bounces back and forth, kind of like a figure eight. With these panels, when the wave hits, instead of it being able to bounce straight back and create this figure eight, it disperses and redirects the wave. Instead of the sound energy creating uneven buildup (peaks and voids) all around the room, we obtain a distributed, even energy that makes the sound in the room nice and clear."

The various sized cones are positioned and sized using a Fibonacci sequence (0, 1,1, 2, 3, 5, 8, 13 etc...), a series of progressively sized segments that follow a balanced ratio. Leonardo Pisano Fibonacci, a medieval mathematician, first identified the sequence in which each term is the sum of the two previous terms (2+3=5, 3+5=8 etc...). The Fibonacci sequence abounds in the natural world in such examples as the interior of a nautilus shell, the scales of a pine cone, and the seed pattern in the head of a sunflower, said Magyari. "I like what I refer to as organic solutions when I'm designing and working on different inventions," he added. In his panels, positioning the cones in a Fibonacci sequence "results in true broadband diffusion that can cover the full audio spectrum."

The panels act in concert to manage and tame uncommonly low frequencies, the grand daddies of the wavelength spectrum. "One panel 'talks' to another, so that when a wave comes, it hits the pair," said Magyari. "Then all of the panels 'talk' to one another to manage even lower frequencies." The end result? A sonically equalized facility that "allows the room to have a lot of energy but brings extreme clarity to the space," he said. The cones are hollow in back, and can be backfilled with sound absorbing material, such as mineral wool, fiberglass or polyfoam, if any absorption is needed at all.

A SOUND INSTALLATION

Fortunately, the panels are much easier to install than invent. "It drills almost like wood, and it has standard screw fasteners that hold it in place," said Magyari. "There's basically a metal cleat that goes on the wall, which is kind of the rest. Then the parts get lifted onto that cleat, and then they're fastened into the studs."

Some panels are suspended in the air as at a proposed Walled Lake High School installation. In those circumstances, "there's a lift mechanism that holds the panel and puts it in place for installation," said Magyari. The panels are both easy to install and inexpensive. "Although you can't compare apples to oranges, these panels come in at about 25 percent less

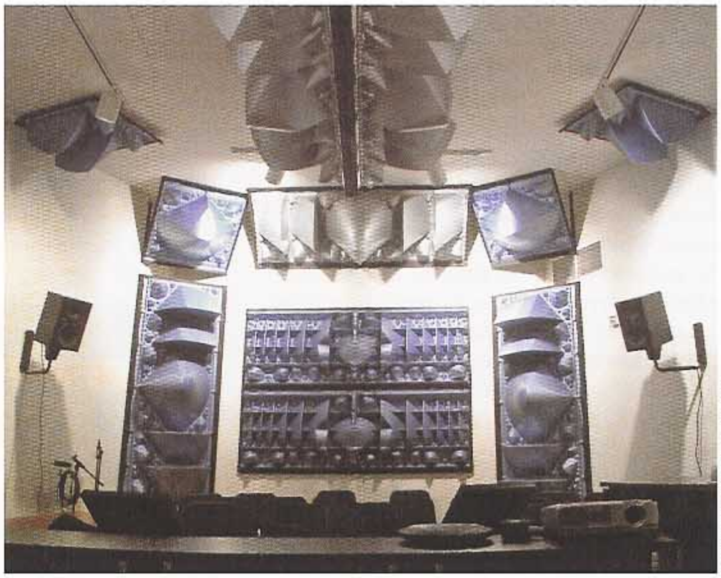

PHOTO COURTESY OF GOLDEN ACOUSTICS

This cutting-edge technology has attracted nationwide attention, not only in the bastions of the music industry – Nashville and Los Angeles – but also in churches, auditoriums, and industrial facilities in Michigan and across the country.

than competitive products," he added.

Actual installation at WSU began in late December 2004 and continued through January 2005. The panels were installed in three sections: the first installation covered the back wall, the second clad the sidewalls and ceiling, and the final installation blanketed the front of the room to produce the array of futuristic panels. Each installation phase allowed Golden Acoustics to more clearly pinpoint the source of trouble. "We found that once the back wall was up, we could actually hear where the sound was building up in the room," said Court. "Before you really couldn't identify it. It was all muddled together.

"We've now had a few months to live in it, get used to it, listen to it and record in it, and the results have been great," said an enthusiastic Court. Golden Acoustics has applied for a number of patents on the product.

The next step is to install a panel system in the larger musician's space just beyond the glass window of the control room. In this way, the panels will help accurately record the original live sound and will accurately mix the different tracks of the recorded sound. "When we brought musicians to play inside the control room, we found that not only was it more accurate for the engineer in the room, but also for the musicians listening," said Court. "Their intonation of pitch and the way they could hear other musicians increased incredibly. There was a good sixty percent to eighty percent better efficiency for the musician communicating to other musicians. Once transposed into the musician's space, the sound would come full circle. We'd be able to both capture sound with these panels as well as accurately listen with these panels."

Work will first begin in the rear left of the musician's space, the area discovered to have the grossest sound distortions. "In our initial testing we found that area to have a lot of flutter echoes, or definitive reverberation where you could actually hear the echoes," said Court. "After we clean up one spot, it all of a sudden clarifies other spots that have issues." At publication, installation was expected to begin in May 2005.

AN EVOLVING AND EXPANDING TECHNOLOGY

The panels are composed of a US Gypsum patented material with a density greater than 100 pounds per cubic foot and an overall thickness of 3/8 inches. As the panels evolve, the weight has decreased from 240 pounds for a 3-by-8-foot panel in the WSU studio to a current level of 150 to 160 pounds for the same panel in a future installation. "The weight keeps coming down," said Magyari, "but the density per square inch, which is needed to break up sound waves, remains the same."

The panels can be painted any color without impacting acoustical performance. Also, acoustically transparent stretch fabric can camouflage the exposed panels without compromising acoustical performance. With digital photography and computer simulation, a photo can be taken of any material and then transposed on the fabric to achieve the same appearance. A fabric simulation of a marble wall cladding in a church interior, for instance, would be easy to accomplish. In this way, churches, structures notorious for blurry sound and bad echoes, would enjoy fine acoustics while maintaining their desired aesthetic appearance.

Locally, Golden Acoustics has several projects already in the pipeline, including retrofitting the band rehearsal room at Walled Lake Central High School and analyzing the acoustics of two churches in the Detroit area, plus a large field house plagued by echoes. The firm has launched its innovative panels across the country and has projects lined up in Los Angeles, Nashville, and cities in Florida. Plus, its range of applications is expanding rapidly from the music industry to churches, restaurants, and even factories. Nationally, the firm's work includes acoustically treating several churches in Florida and California and remedying the acoustics in the studios of a Los Angeles radio station. "Originally, we felt it would be mainly the music industry but the need is everywhere," said Magyari. "We did some preliminary studies on (factory noise), and these panels are able to handle transient noise problems from engines and motors and reduce them radically." One facility in Michigan will serve as the showcase for the product's use in industrial applications.

The word is beginning to spread on this exciting new acoustical control technology, a marriage of the science of sound and mathematics. While ornate plasterwork gave many of the old concert halls their stellar acoustical performance, intricate mathematical calculations - as detailed as the old plasterwork – give these revolutionary panels their ability to infuse wonderful acoustics and unmatched clarity into any room. "With this technology we will be able to show any architect, homeowner or facilities owner how to very easily get great acoustics in their room," said Magyari. "We're really de-mystifying acoustics, and with this technology simplifying getting great sound."