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E X T E R I O R P R O D U C T S I S S U E

A cylindrical, silver-colored speaker is suspended from a ceiling by a chain and cables. The speaker has a white label with the text "SOUND MASKING SYSTEMS" in bold, black, sans-serif font. The background shows a server room with blue cables and a view through a glass partition into a workspace with computer monitors and desks.

**SOUND
MASKING
SYSTEMS**

Open Quiet

Open office projects offer a sound opportunity for contractors.

By Jonathan Leonard

All trends bring about winners and losers. And those confronted with the challenges of acoustics in today's open-office designs are no different.

The good news for building owners is that they can realize lower build-out costs in open-plan offices. But for tenants, as well as the architects and designers who lay out these spaces, the news is mixed.

Commercial tenants may realize more affordable rents in open-plan offices but the noise and distractions inherent in these offices can hinder worker productivity. Cell phones, computers, speaker phones, fax machines, and casual meetings and conversations in nearby cubicles disturb employee concentration throughout the day.

While the open-plan office is designed to encourage interaction and collaboration, noise from even casual conversations nearby can be overwhelming and distracting. According to an industry study by Bosti Associates, striking a balance between interaction and independence is key to maximizing comfort and productivity.

Specifically, the Bosti study showed that "the two workplace qualities with the strongest effects on performance and satisfaction are those supporting distraction-free work and supporting interactions with co-workers. Both of these top workplace design priorities must exist without compromising the other."



Statistics show that sound masking benefits open office spaces.



Still other studies have shown that it takes 15 to 20 minutes for workers to regain concentration following a noise distraction. Obviously, open-office distractions can have a significant—and costly—impact for business managers. In turn, building owners must cope with potentially higher tenant turnover and even reduced property values resulting from acoustically inferior office spaces. These issues create a dilemma for designers, who are being asked to create open office spaces where there are no doors and few, if any, floor-to-ceiling partition walls.

However, this dilemma also creates opportunities for contractors to incorporate a value-added sound masking component into their scope of services. By contacting and working with a local sound masking manufacturer, contractors should be able to demonstrate to the building owner the effectiveness of a properly designed and installed professional sound-masking system.

Sound-absorbing ceiling panels, carpeting and relocatable partition walls can provide varying levels of sound control but open-office acoustical issues usually cannot be solved without professional sound masking.

WHAT IS SOUND MASKING?

Sound masking introduces an unobtrusive, ambient background sound into open spaces and other areas using speakers installed in the plenum above a suspended ceiling. The technology has advanced tremendously since the days of simple white noise machines. Good sound masking systems are very soothing, producing a gentle sound spectrum that masks noise, speech and

SOUND MASKING AND HIPAA REGULATIONS

One significant sound-masking opportunity for contractors lies in healthcare settings where confidential patient information is discussed.

The Health Insurance Portability & Accountability Act of 1996 was established to provide healthcare coverage continuity and accountability. HIPAA has mandated new privacy standards for transmitting health information in electronic, paper and oral forms.

The new rules require that work spaces be reasonably safeguarded to protect personal health information. Pharmacies, doctors' offices, public health authorities, life insurers, universities, hospitals, military medical bases and any other setting where PHI is discussed are affected.

To meet the new HIPAA standards, contractors and their clients may need to take two steps. First, upgrade ceiling panels from general-purpose panels to those offering higher NRC and CAC ratings. Second, even the most acoustically effective ceiling panels will most likely need enhancement. This can be done with sound masking.

The new standards were established with an April 14, 2003, deadline. Most healthcare facilities do not require expensive sound proofing or elaborate retrofits. In the vast majority of cases, upgraded ceiling tiles and a quality sound masking system will be sufficient to meet most HIPAA requirements. Those who fail to comply are beginning to face large fines and/or other sanctions by the government.

For more information about oral privacy and HIPAA, visit www.hipaaoralprivacy.com or www.lencore.com.

SOUND MASKING IN ACTION

(CASE STUDY OF KNIGHT RIDDER INFORMATION INC.)

The Facility Manager for one of the largest newspaper publishers in America was tasked with consolidating three buildings into one new facility and with a directive from the company CEO had to change the entire space (135,000 square feet) into open office space. This was a significant change from the previous office environment that housed nearly 90 percent of the staff in private offices.

The shift encouraged the publisher's sales force to get on the road, away from the traditional branch office and created a new atmosphere that increased productivity and simultaneously cut the space requirements by one third. Feedback from the field offices showed that sales did increase. In the words of the facility manager that ran the project, this "success story could not have been written without the use of sound masking. Sound masking was by far the most important aspect of the successful implementation of our project."

To ensure continued success at new corporate facilities the facility manager identified seven key objectives. The top three objectives, in order of importance, appear below:

- Sound masking must be incorporated into the environment.
- Noise control and privacy for individual workstations are functions of design layout, office size, barrier height, degree of closure and the orientation of the primary work area.
- Acoustical ceiling tile must be top rated.

In conclusion, the study found that the successful open office can be achieved through a balance of carefully chosen and engineered systems, finishes, and layouts. A follow up after two years showed that the facility's employees continued to maintain a balance between privacy and interaction and that the open space office plan worked to break down barriers and open lines of communication for greater efficiency and productivity. The company already achieving one of the highest sales per employee ratios in its area, achieved an increase of more than 20 percent in productivity and remains proud that their decision to use sound masking contributed to these increases.

distracting sounds. Recent advancements have made these systems more highly effective than ever in both open- and private-office environments.

The masking is non-directional, harmoniously uniform and can be easily adjusted to meet a variety of conditions and privacy needs. Usually, the masking level needs to be three decibels louder than incoming speech from adjacent workstations.

Sound masking works by producing a unique digital broadband sound spectrum complementary to the spectrum that effectively covers speech levels. The sound is amplified through individual speakers that are typically set every 15 feet or so above a dropped ceiling. The sound then filters down through ceiling panels and into the office space, providing a constant level of background sound that covers up office noise and lessens the intelligibility of speech. Sound masking technology has proven to increase worker output by anywhere from three to 20 percent (see sidebar below).

There are two basic types of sound-masking systems:

One type uses speakers that point directly down onto the workspace. However, this set-up can create "hot" and "cold" spots throughout the office area, meaning that the system can be effective in certain areas and not effective, as well as intrusive and distracting, in other areas.

Most acoustical consultants agree that a better approach is to direct sound upward, into the ceiling plenum. This allows the masking noise to bounce off the floor/ceiling slab and re-enter the office space after being filtered by the ceiling panel similar to the way ambient light evenly lights a room. This lets each unit's sound overlap nearby units, creating an even, equally effective sound level throughout the space.

COSTS AND INSTALLATION

Experts say more than 99 percent of all corporate offices can benefit from masking.

Contractors who want to offer value added sound masking to clients need to do the following: First, identify the client's need for better acoustics. Ask them to consider these questions:



Direct sound travels directly to the listener's ear from its source.

- Will these employees need speech privacy and confidentiality? Will the work environment be as productive and pleasant as possible? Have they eliminated private offices?
- Would productivity, efficiency and morale be lifted if there were fewer distractions in the office?

After identifying the need, secure a copy of the furniture and ceiling plan for the space. Then determine the following:

- What type of ceiling does the client have (acoustical ceiling panels, gypsum board, open/exposed)?
- What is the approximate ceiling height (8 to 10 feet, 12 feet, 16 feet or more)?
- Approximately what height is the plenum area (1 foot 3 feet, 6 feet or more)?
- Are there other acoustical proper-

ties in the space (carpet, partitions, ceilings, acoustical wall panels)?

- Is the client interested in a paging/music system in addition to the masking?

Once these questions are answered, consult a sound masking manufacturer so that a sound-masking plan can be designed for the space.

An average sound-masking project can be budgeted at \$1 to \$1.50 per square foot, furnished, delivered and installed, depending on size, scope and location. Employee productivity increases generally offset the client's initial costs.

DYNAMIC DUO

For best acoustical performance in open-office environments, sound-masking systems should be installed with acoustical ceiling panels that deliver a

high noise reduction coefficient. This makes cast ceiling panels an ideal choice. Not only do cast panels deliver excellent NRC performance but they also provide high ceiling attenuation class performance, which is desirable for closed- or private-office spaces.

For NRC and CAC, cast panels are the best option, because many open office environments include private-office spaces as well. Cast ceilings provide a great solution, are exceptionally durable, and have the ability to withstand use and abuse resulting from plenum access without scratches or nicks. So, should the need arise to reconfigure sound masking within the plenum, there's no need to worry about panel damage. **W&C**

Jonathan Leonard, vice president and principal of Lencore Acoustics, has been involved in the construction and facility industry for more than 20 years. Leonard combines his acoustical expertise with a progressive approach to further sound masking technologies. He provides information to industry trade publications on acoustics and sound masking and has authored and co-authored several articles with relation the HIPAA and oral privacy regulations.

A SOUND UNDERSTANDING

In order to fully understand how and where to apply sound masking, it is helpful to review some of the basics regarding intended and unintended sound and how it can be transmitted, detected, controlled and measured within a given space.

TYPES OF SOUND

- Direct sound travels directly to the listener's ear from its source.
- Reflected sound reaches the ear after bouncing off one of more surfaces in a room.
- Transmitted sound passes through a solid body, such as a wall, partition or ceiling suspended over two rooms within a ceiling plenum.
- Diffracted sound bends over the top and around the sides of partitions and walls.

Almost all building materials can absorb, reflect and dampen sound vibrations to some extent. But for critical surfaces, such as ceilings, panels made of mineral fiber or fiberglass are chosen for their strong acoustical properties.

By absorbing, blocking and covering sound, high-quality ceiling panels and sound masking provide a solid foundation for effectively managing the acoustics in open-plan spaces, closed offices and conference rooms.

MEASURING SOUND

Acoustical efficiency can easily be measured by a sound-masking professional using a number of standard industry standards and calculations. To determine the acoustical efficiency measure how

well ceiling and wall panels absorb and block sound, and how effectively a sound-masking system above covers the remaining noise. Some of the methods, tools and key terms used in this exercise include:

- Noise reduction coefficient measures the degree to which a ceiling panel absorbs sound. NRC is represented by a number between 0 and 1.00, which indicates the percentage of sound reaching the panel that will be absorbed. A ceiling panel with an NRC of .50 or higher offers significant sound-absorbing properties.
- Articulation class measures how well a ceiling panel prevents sound from reflecting back down to adjacent workspaces in an open-plan environment.
- Ceiling attenuation class indicates the ability of a ceiling panel to block sound transmission. A ceiling panel with a CAC of 40 will reduce transmitted sound by 40 dB. A ceiling panel with a CAC of 35 or higher offers significant sound attenuation properties.
- Sound transmission class measures how well a wall or partition prevents sound from transmitting to the other side.
- Articulation index represents how well speech can be understood in a given space. AI is expressed as a decimal value between 0 (speech is unintelligible) and 1.00 (speech is easily heard and understood). AI can be measured using American Society for Testing and Materials Test E-1130.
- Privacy index is the inverse of articulation index. The PI represents how well the elements in and the properties of a space render outside conversations unintelligible.