



tion—open or closed office layout, restaurant, classroom, theater—the ceiling can make or break the space. What can fall out of the box, so to speak, are acoustical comfort, adequate lighting, aesthetics and more, all of which impact work and life quality issues such as job satisfaction and employee productivity.

## MORE THAN TILE AND GRID

While commercial suspended ceiling systems have been around for nearly 70 years, and have been installed in thousands of buildings, it is still important to understand what products and systems are available today, the high-performance aspects they offer, and the manner in which to specify them depending on the project's requirements.

Unfortunately, despite the considerable value and benefits that ceiling systems offer to a commercial space, they often are one of the first areas in which

costs are cut to save money on a project. In general, the acoustical and ceiling comprises about 8 percent to 10 percent of the total cost of new interiors construction, yet is often the target of downgrades that lead to compromised performance in the long run. Before opting for a less expensive ceiling system than the one originally specified, the architect and building owner should weigh the effect downgrading will have on the spaces overall performance relative to the actual cost savings realized.

The best ceiling systems offer numerous high-performance features that are worthy of close consideration. Among the features designers and architects should keep up-to-date on acoustical performance, heat and humidity resistance, light reflectance and durability

## SOUNDING OFF

Once of the most important recent advancements has been

the development of an “acoustically transparent surface, a panel that features a smooth, unperforated, unfissured surface with favorable acoustics,” says Chris Schmidt, senior product manager/ceilings at USG Interiors, Chicago. “It changed the industry”



Indeed, today the smooth, unperforated look has expanded to full product lines of sophisticated ceiling panels from many manufacturers in the industry. The acoustics they offer are far superior to those of early tile products.

To achieve the appropriate acoustics for a space, Rob Blancett, director of USG's materials and construction laboratory, suggests that architects and design professionals closely consider how the space will be used. In an open office space, for example, speech privacy from workspace to workspace should be a chief consideration.

“In that case, it is necessary to choose ceiling panels with a

very high sound absorption and articulation class,” he says. “On the other hand, if you're designing a night club, micro-brewery or other hospitality-type venue, low sound absorption becomes important in achieving high-energy, vibrant atmosphere with high noise levels.”

Acoustical ceiling panels are specifically designed to absorb or contain sound, depending on their intended purpose. Panels are typically made of absorbent materials such as mineral fiber or, for truly high performance, fiberglass.

Two types of industry ratings are most commonly assigned to panels to indicate their acoustical abilities. “Ceiling Attenuation Class” measures the amount of sound passing through a panel and the plenum into an adjacent space. Panels with a high CAC are intended for individual closed office spaces where speech privacy is desired. The “Noise Reduction Coefficient” measures the amount of noise a panel can absorb. Panels with a high NRC

are excellent for open-space “bullpen” type offices where overall noise levels must be kept to a minimum.

While the properties of CAC and NRC often mean they act in opposition to each other (a panel with a high CAC will have a lower NRC), certain high-performance panels recently introduced contain both high CAC and NRC ratings. This feature becomes an important advantage to designers interested in using the same ceiling panel for a monolithic look in open and closed offices, yet needing excellent acoustics in both areas. Companies with broad product lines also may feature certain panels with the same decorative facing and different internal construction to deliver both high NRC and high CAC.

Another rating “Articulation Class,” increasingly will be seen on product labels, particularly from USG. AC measures sound reflected from the ceiling to adjust workspaces in open-plan offices. It indicates how much or how little of a conversation one would be able to decipher.

While one of the best ways to determine the acoustical needs of a space is to hire an acoustical consultant, understanding the sound rating designations—or at least knowing that they are important—is invaluable. To this end, USG Interiors and other leading ceiling manufacturers are now adding Underwriter Laboratories certification for acoustical performance to their product lines. Although manufacturers have long-established relationships with UL for fire performance, the new UL certification provides third-party verification that they are adhering to ASTM test methods for the aforementioned ratings.

Another point to note about commer-

cial-grade acoustical ceilings: They are increasingly being used in place of standard retail-grade systems in residential construction. Just as many higher-end homes now feature other commercial-grade ceilings in rooms such as a home theater, office or gym, where it is important to have excellent acoustics in the room or to prevent noise from passing into an adjacent room.

## **NO SAG HERE**

Following on the heels of improved appearance and acoustics was an advancement in sag resistance. Ceiling panels can have inherent problems in high heat and humidity environments. Exposure to fluctuating conditions can cause panels to droop or sag.

As anyone who has worked extensively with climate-controlled buildings knows, sag-resistance-ceiling panels can be indispensable for many reasons. While they are a must for buildings in exceptionally hot and humid climates, they are also indispensable in regions with seemingly tame weather patterns, such as the Midwest.

“Anyplace where temperature fluctuations exists, which causes sag more than a constant climate extreme, you need sag-resistant panels,” says Carol Hufford Deely, manager/strategic marketing for USG Interiors. “In the United States, the Midwest experiences greater climate fluctuation than any other region, so sag-resistant panels are important there. Any buildings in which climate-control systems shut down partially or completely during certain periods—such as overnight, weekends or in the case of schools, over the summer—also benefit from sag resistance.”

Hufford Deely also points out that sag-

resistance can buy the architect and builder time and flexibility during construction. The panels resist exposure to various environments during transportation to the jobsite and onsite storage, and can be installed before a building's windows, walls or HVAC system are complete, thus avoiding project delays. "With the small price differential between these and non-sag resistant tiles, the designer or architect really can't go wrong specifying sag-resistant tile," she says.

Adds Schmidt, "We may see the day in the not-too-distant future when there will be a minimum industry standard for heat and humidity resistance that's higher than the current 70 percent. In that case, today's high-performance panels with sag-resistance up to 95 percent humidity are definitely a good long-term investment."

## **HOW ENLIGHTENED**

Other advances in high performance include improved light reflections. Current panels with high light reflectance from USG are finished with special coatings that achieve a LR as high as 0.92, the highest available LR in the industry. The industry average for panels is from the 0.70s to 0.80, while anything above 0.85 is considered high.

There are a number of advantages to using panels with high LR. Under some conditions, they can help reduce the number of light fixtures needed to illuminate a space by as much as 10 percent to 15 percent. High LR also helps realize energy cost savings. Less energy is consumed overall and per fixture by using fewer lights and lower-watt bulbs that generate the same amount of light due to higher

reflectance. Fewer fixtures also mean fewer repairs and lower maintenance costs.

“High light reflectance is especially important with general office space and school computer labs, where lighting ‘hot spots’ cause uneven lighting and glare on computer screens,” Hufford Deely says.

## **IT TAKES A LICKING**

Ceiling-panel durability also is considered a vital high performance feature and has seen significant recent advancement. Durability is important in most settings, from schools to health care facilities to general office. The life cycle of a commercial building space averages 15 to 18 years, after which the space usually is taken over by a new tenant, reconfigured or updated. When the walls are moved or maintenance personnel access a ceiling to make repairs, the panels are subject to scrapes, bumps and dents. Anyone who remembers being bored in school classroom years ago also knows that ceiling panels make enticing targets in which to impale sharpened pencils.

Consequently, manufacturers such as USG Interiors have added more effective hardeners to the surface coating and edge detail to lessen the likelihood of scratches, dents and other damage. It also pays to invest in cast panels rather than lower end non-cast panels. Cast panels are baked during the manufacturing process to offer exceptional durability and the added benefit of high definition in their surface design.

In terms of durability, look for panels that have been tested to withstand the abuse commonly found in the field,

such as handling by trades people and contact with hangwires and grid.

## **IF I WERE A CEILING EXPERT . . .**


While all the high-performance features currently available in ceiling systems help ensure success in a project, nothing beats experience. Projects that can afford to include an acoustics consultant will benefit for the long term from this initial investment.

One thing an acoustical consultant can do is look beyond initial building costs to optimize worker comfort. While spending decisions often are made on a first-cost basis, about 95 percent of the total operating cost over the lifetime of a building pertains to people—their hiring, training, salaries, etc. Decisions made on a project's front end that affect worker productivity could influence, for better or worse, worker turnover or productivity for the life of the building. If owners, architects and designers optimize worker comfort in a building by using high-performance products, including ceiling systems, they'll see higher worker satisfaction and productivity.

## **FUTURE DEVELOPMENTS**

So where are high-performance ceiling systems headed in the future? How will they augment what design professionals can offer their clients? High performance is headed in several directions. First, the concept includes aesthetic performance as well as more technical features. Ceiling systems are usually thought of as one-dimensional entities, but they are going the way of 3-D. USG introduced last year products that

add curves and customized three-dimensional depth, as well as a variety of available decorative materials, to the mix of aesthetic possibilities.

The ceiling industry is a dynamic business. Ceilings offer endless opportunities for innovation and improvement to meet the changing needs of business and residential construction. In the future, panels will be even lighter and more cost-effective, yet still deliver more acoustic performance, light reflectance and durability. Also look for more integration of the ceiling system with other ceiling-mounted components such as lighting, HVAC, sound equipment and even computer equipment. With its growing high-performance capabilities, expect the ceiling system to become more integral to spaces than ever before. 

#### **About the Author**

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