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Materials and Sound

By Benjamin Davenny



The selection of room surfaces can greatly impact the quality of sound in a space. For example, acoustically reflective materials, like drywall, marble floors, and glass, can create a “lively” acoustical environment where sounds continue to reflect around the space; this acoustical liveliness is the “reverberation” of a space. Too much reverberation can create an intensified volume level of activities and conversations, which may make busy areas bothersome or speech unintelligible. Alternately, selecting acoustically absorptive surfaces, like velour curtains, acoustical ceilings, or sound-absorptive panels, can create a “dead” sound with minimal reverberation.

The finishes and furnishings that architects and interior designers specify for a design contribute to the acoustics within a space. During the design, the acoustics of the space can be assessed to confirm that they’re appropriate for the use of the space, and whether changes to the finish materials need to be made.

Existing performance spaces or lecture halls that have too many absorptive surfaces will have reduced sound levels; as a result, the sound from the performer or lecturer to the audience may seem weak. In these types of spaces, sound reflections are helpful to reinforce the sound from the performer or lecturer. The solution may be to either remove some of the absorptive materials from the space; to cover the existing absorptive materials with more reflective materials, such as several coats of paint; or to electronically add reverberation through a specialized sound system that introduces the desired reverberance to the space. Alterations to the HVAC system may also be made to reduce excessive background noise.

You may already have experienced spaces with too many reflective surfaces. A classic example is a natatorium or gymnasium, where the reverberance can be dramatic and problematic. But, there are also more traditional spaces, such as office areas or libraries, where too many acoustically reflective surfaces can also



be problematic. In these spaces, which require a level of privacy and quiet, the reflective surfaces may be corrected by adding absorptive materials to the ceiling, walls, or floors. Carpet is often used to reduce footfall noise, but it has marginal sound-absorptive characteristics. Painted gypsum board, which is often used on walls and sometimes ceilings, is reflective, and can be treated with sound-absorptive panels made from glass fiber or other absorptive solutions to improve the sound quality in a space. In particular, open office space designs often include high solid panels between workstations and acoustical ceilings to reduce the distraction of workers from conversations of nearby workstation occupants.

The recently completed Startup Labs at Microsoft's New England Research & Development Center in Cambridge, MA, had these types of acoustical concerns. The workspace areas were open and inviting for the employees. To achieve effective acoustical conditions, a spray-on cellulose product was used on the ceilings in the atrium and open-office areas to create a sufficiently absorptive quality in the building's open-office areas. Closed rooms near each open-office area also provide employees with an isolated area for making phone calls or holding private discussions.

The project's architect of record, TRO Jung | Brannen of Boston, contracted Acentech to consult on the acoustics of the space, beginning with the fit-out of two leased floors that house open-office areas, conference rooms, and a large atrium space. The vision of the design architect, SkB Architects of Seattle, included many unique materials, including an aluminum open-cell foam product with sponge-like holes to be installed at the ceiling of the atrium space. After reviewing the acoustical data for the product and determining it would have a modest level of sound absorption and a relatively small area of coverage, Acentech approved the use of the same spray-on cellulose product that was used in the open-office areas to be applied to the ceiling's structural metal ceiling deck. This solution provided sufficient absorption to offset the modest performance of the aluminum foam material installed along the underside of walkways and at the ceiling perimeter. The resulting acoustical conditions achieved less reverberation within the atrium space.

During the design, Acentech and TRO Jung | Brannen identified that there would be acoustic concerns with a cylindrically shaped room within the atrium due to its unusual shape and the painted gypsum board used for



the walls. The primary concern was the intense acoustical focusing that would occur due to the curved surfaces. While the designed acoustical panels were not installed during construction, a snap-lock wall panel with fiber glass infill was added afterward to provide sound absorption and resolve the unique acoustics that occupants reported while using the space.

The collaboration between the future users, the architect or interior designer, and the acoustical consultant is integral to ensuring that the acoustic quality of a space fits its users' needs. In most cases, the design process can be most efficient and avoid significant design and cost changes by introducing an acoustical consultant at the beginning of a project so he/she can advise on the impact of finishes and furnishings as they're considered (and before they're specified). The acoustical consultant can also provide a range of sound-absorption options from less expensive (spray-on cellulose) to more expensive (smooth, acoustical, plaster-like finishes); however, an acoustical consultant may also be introduced to a project team later to review what's been designed and recommend adjustments for optimal acoustical quality.

When acoustics are considered in collaboration with design, finishes, and furnishings, it can contribute significantly to the design of a space and the way it functions acoustically, ensuring that the user's experience is aesthetically and aurally pleasing.

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