WORKPLACE ACOUSTICS
THAT WORK

With Acoustics Now Recognized as a Major Influence on Office Productivity, Design and Selection are Critical

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Today’s workplace is primarily an office. Statistics indicate most of us work in a “built environment” and even manufacturing facilities are utilizing the same environmental criteria established for offices. Productivity is the reason. Numerous studies that show that optimum productivity is only possible when the environment is ideal. These same studies identify acoustics as a key element of this productivity.

The task of the office designer and contractor has never been more complex than today. Aesthetic standards are higher than ever before, and because no single design style dominates the contemporary scene, creative versatility is much in demand. As organizations change, so does office design. As technology changes, so do organizations. And if that isn’t enough, entire corporations are changing their size, products, purpose, and image, literally overnight. Witness the vast number of acquisitions, mergers, takeovers, and restructurings.

For those with the necessary skills and resources, today’s office market is stimulating and challenging. Through the decade of the 70s, innovations such as the “Landscape Office” or “Bureaulandshaft” as its originators called it, swept through the design community, making it an exciting time to be in this field. But along with new degrees of creative freedom came stringent technical requirements. Open-plan offices brought more than a new look to the workplace; they also created demands for better control of lighting, air delivery and acoustics.

Today the open plan is no longer new. It has become a standard part of the design repertoire. In fact, a new trend is emerging. Top office designers and facility managers are utilizing the best of both the open and closed plan concepts. Most large offices today mix open and enclosed areas in about a 70%-30% ratio, which means the designer and contractor must consider two different sets of technical requirements for the resultant space. Satisfying diametrically opposing criteria has created a need for innovative products and building system solutions.

When you look at an office layout, what you see has traditionally been the hallmark of design awards. Today, what you hear (or don’t hear), what you breath, how you see and feel—and ultimately, your productivity, have become equally important.

Acoustics is a key element of the workplace environment, yet selection of the proper products must be made

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“The acoustical dilemma for today’s office stems from the trend to mix open and closed offices.”

with an eye to other environmental criteria. Only with a full understanding of today’s evolving acoustical technology by all trades, can one assure that the owner and user will achieve optimum productivity.

The Acoustical Dilemma:

Achieving speech privacy is the prime goal in an office environment. Once an adequate degree of confidential or normal privacy has been achieved, other acoustical attributes such as long reverberation times (echos) and “noiseness” usually are resolved in today’s open/closed offices. This was not always the case. When only closed offices were the norm, one could achieve speech privacy by constructing massive walls and floor/ceilings that would block the sounds from the adjoining work station. We utilized evaluatory terms such as Sound Transmission Class (STC) for these barriers. If noise within your own office was a problem, the addition of sound absorbing materials such as acoustical ceiling materials and wall coverings reduced the echoes and the loudness of the offending noise. The effectiveness of a sound absorbing material is measured by its Noise Reduction Coefficient (NRC).

The movement to open-plan offices created a whole new technology. At first acousticians tried to adopt the NRC and STC to the open environment. It became quickly apparent that the techniques used to measure NRC and STC were not providing adequate information to evaluate products and systems in the reality of the open plan office. New test procedures were developed and we now have a whole family of techniques to measure speech privacy and each of the individual elements that make up the open environment, namely the ceiling, space divider, wall coverings, and background masking sound. New single number rating systems such as Speech Privacy Potential (SPP), and Speech Privacy Noise Isolation Class (NIC’), coupled with the NC40 rating for the Background Masking System, measure the effectiveness of a screen/ceiling/masking system in either the field or laboratory. Developed by the U.S. General Services Administration (GSA) for use in their Systems Procurement programs in the 70s, these procedures are now in the process of being adopted by the American Society of Testing
and Materials (ASTM) Committee E-33 on Environmental Acoustics, Subcommittee on Open Office Acoustics. While the test procedures are essentially the same as those adopted by GSA, new terms have evolved for the rating systems. Eventually terms like Articulation Index (AI), Articulation Class (AC) and others will appear.

The acoustical dilemma for today’s office stems from the trend to mix open and closed offices. However, a new batch of products and systems are needed to satisfy the dual criteria.

**Acoustical Products for the Workplace of Tomorrow:**

Change is in store for nearly all the components that make up the acoustical envelope in the workplace of the future. Since flexibility is the paramount need, new products must have the necessary acoustical attributes for any future space use. Specifically, a new ceiling material is required that has both high sound absorption for the open plan and high sound barrier attributes for the closed plan. Also, demountable partitions with highly sound absorptive surfaces are required.

Not normally considered is the impact that these changes will have on the HVAC and lights. Linear air bars, so popular for open plan spaces, are not an efficient solution for closed offices. Fortunately, parabolic lights are suitable for both the open and closed plan but they must be installed so they can be easily moved.

New ceiling products are emerging. A sandwich product composed of a glass fiber board up to 1” thick backed
ACOUSTICAL OPTIONS: Containing sounds in closed spaces and controlling them in open ones involves trade-offs that are sometimes contradictory. New products and techniques are simplifying these problems, providing more reliable and economical solutions.

1) A typical office layout mixing open and closed spaces using a mineral board ceiling throughout has a problem; the mineral board effectively isolates the closed office, but allows sound to travel freely throughout the open area, making it unworkable.

2) Switching to a highly sound absorbent ceiling and part high space dividers in the open area provides the non-reflecting surfaces and high NIC' ratings required for an open plan. But there are still problems; open-area workers don’t have complete speech privacy, and the use of two kinds of ceiling panels compromise aesthetics.

3) Switching to high STC/high NIC' ceiling panels in both the closed office and open areas provides uniform aesthetics and good acoustical control throughout the office.

4) Finally a properly tuned background masking system provides the ultimate in speech privacy for both the open and closed spaces.

with a 5/8” mineral board is now available from at least one manufacturer. Covered with a cloth or highly porous facing, this product potentially has an STC of 45 and an NIC' of 20. These attributes make it highly desirable as a ceiling that need not be changed when the walls move. Where economy is paramount, a glass fiber board having an aluminum foil or other sound attenuating backing may suffice. With both high STC and NIC' ratings, these products will simplify the specification for both today’s and tomorrow’s office configurations.

Background masking sound is a must for the open plan. It works equally well in the closed plan. In fact, research has demonstrated that masking sound will enhance the speech privacy in the closed office to the point that lower STC ratings of space dividers may be utilized.

Demountable partition systems are vital to the flexibility issue. When used in a closed/open plan they should have highly sound absorbent faces. Several workstation manufacturers have entered this market with products that are compatible with their line of part high dividers. Without the sound absorbent faces, these barriers will cause a flanking path in the nearby open areas. Also, they must have a higher STC, and will require extra adjustments to the background masking system as relocation occurs.

To better understand how these elements work, note the above diagrams and related captions.

A Resolvable Dilemma . . .

The most important message for the designer and contractor facing this battery of technical demands is that solutions are available. Even highly innovative office designs can deliver predictable performance. An integrated approach will yield answers that are viable on all counts. In the long run, the new emphasis on optimizing the office environment, and in particular the acoustical attribute, will allow everyone to achieve their full productivity potential. With workplaces that work acoustically, both owner and occupant will proclaim the building a success.

References:
—Owens Corning Fiberglas pub. # 5-AC-14219, 1986.
—Craxton Acoustical Products technical literature.