ACOUSTIC ART

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Noise in Office Environments: Ist effects and Means to Reduce and control it

In the modern workplace, the emphasis is on teamwork, flexibilty, communication and collaberation.

For most companies this means open plan work areas. Todays workplace dictates (a) the need for open and easy communication between members of staff (b) that we provide an environment that promotes the exchange of ideas and (c) an efficient working environment. In fact, in 2004, approximately 73% of office workers performed their work in open plan offices (Sykes, 2004) As a result modern office environments have a requirement for both a flexible and efficient use of space. In addition, organisations have been shown to save a significant amount in development costs when creating an open plan office environment rather than the traditional format of offices (Hedge, 1982). Whilst these spaces may satisfy many of the practical requirements of modern business, however they can lead to conflict in the workplace

Employee satisfaction is extremely important in the workplace as it influences an organisations success and performance by improving morale, this in turn reduces staff turnover (Dole & Schroeder, 2000) It has been shown that employees who are comfortable with their working environments are more likely to generate better work as the physical environment affects their job perception, attitudes and job satisfaction (Lee & Brand, 2005; Sundstorm, Town, Rice, Osborn, & Brill, 1994), careful attention must therefore be paid to designing work environments in order to facilitate productive work outcomes

Over the years there has been plenty done to improve the ergonomics of the office from posture chairs to height adjustable sit stand desks, but what are we doing about the problem of unacceptable noise levels and poor speech privacy, more thought needs to be put into the overall design of open plan offices where all the necessary areas concerned (Teamwork, flexibility, communicataion & Collaroration) must co-exist in the same space.This can be achieved by the strategic application of Acoustic products from ceilings to walls and the furniture itself.

As the open plan office evolves, the aim should now be moved from space efficiency to staff productivity which is now limited due to the inability of staff to concentrate,

While the build up of noise resulting in overwhelming noise levels in working environments can be a problem, one of the most significant acoustic problems is that lack of privacy. While overall noise levels may be quite low (in some cases too low) interruptions resulting from distracting conversations, telephone calls, printing machines etc all contribute to a less than ideal working environment. In fact studies indicate that approximately 80 % of office workers believe that their productivity would increase if their working environment was more acoustically private. (American Society of interior Designers; Armstrong World Industries, Inc Dynasound inc, miliken and co; steelcase inc 2005)

Solving the Problem of Noise in the Workplace

Methods for controling and solving acosutic problems can be summarised by the acronym ABC

A – ABSORB

Describes the absorrtion of sound waves by suitable materials

When sound waves enter a porous absorber, the vibrations of the fibres and air pockets result in energy being lost in the form of heat. This type of absorption must be thick enough to target energy at speech frequencies (At least 20mm thick) It is important to understand that the placement of absorption on a surface does not affect direct sound ie. from the speaker's mouth) but will reduce reflections off hard surfaces which lead to decreased speech intelligibility and increase noise levels.

B – BLOCK

Describes the alteration of the sound path using screens, panels & walls

In order to interrupt sound on it's path across a room or office, a suitable barrier has to be placed between the source and receiver. The barrier should be suitably massive in order to stop sound travelling through it easily and suitably tall and long to minimise sound travelling over and around it.

C – COVER

Describes the use of a system which produces background sound such as white noise systems and speech privacy systems

This is the most counter-intuitive of the solutions as it involves adding noise to the space in order to make unwanted noiseless distracting. Some noise in the working environment such as steady state noise from air conditioning units can be advantageous as it provides a useful background to aid speech privacy and hence provides an environment where confidential conversations can be held without being overheard. This acoustic backdrop may also aid in masking the more disturbing sporadic sounds mentioned above

A – ABSORB: The Effects of Acoustic Absorptive Reverberant Materials in Improving the Office Space Acoustic Environment

Acoustic absorption is vital in an office environment to absorb and prevent the space from becoming excessively reverberant. The presence of multiple speakers in a highly reverberant environment creates a phenomenon referred to as “the cocktail party effect “ (arons, 1992). This occurs due to the high level of reverberant energy causing an increase in the overall loudness of the ambient noise and affecting speech intelligibility. Speech sounds from the speakers cause a further increase in this noise, causing them to exert greater vocal effort in order to be heard. This has a circular effect in, once again, raising the ambient noise level and decreasing speech intelligibility. Acoustic absorption may be provided by a number of different products, including acoustic ceilings, wall absorbers, absorbing acoustic screens and floor coverings. Absorptive materials absorb much of the sound that is incident upon them, minimizing the amount of reflection, reducing the amount of reverberation in the space and hence reducing the ambient noise level and improving speech intelligibility. In addition these lowered ambient noise levels will cause employees to speak at a lower sound level, thereby preventing the occurrence of the cocktail party effect.

B – BLOCK: The Effects of Acoustic Screens in improving the Office Acoustic Environment

According to some studies, speech has been found to be the most annoying sound source in open plan offices. The most distracting speech originates from the nearest workstations. Therefore, speech privacy between workstations should be as high as possible. Acoustic screens are commonly used between desks and can act as a sound barrier as well as providing sound absorption. Screens may also be used as temporary partitions to provide cellular office space. The screens aid speech privacy by reducing the level of sound transmitted (for example from an operator using a telephone) between workstations or, where screens are used as temporary partitions, to provide a degree of privacy for the occupants of the cellular space. Research has shown that the use of relatively high acoustic screens with suitable blocking and absorbing properties, coupled with a highly absorbent ceiling make the largest difference to acoustic privacy (Bradley 2003)

C – COVER: The Effects of Noise Masking Systems in Improving the Office Acoustic Environment

A ceiling manufacturer conducted studies in which the ceiling systems were replaced with absorbent equivalents and sound masking systems. Employees in a number of companies were surveyed prior and following the works. The workers indicated that freedom from auditory distractions was the most important feature in efficiently and effectively accomplishing their work tasks. 80% of workers believe they would be more productive if their workspace provided more acoustical privacy and in cases where distractions from noise were reduced a 25% increase in the perceived quality of the work environment was reported, with a 27% reduction in stress and a 20% increase in productivity (American Society of interior Designers; Armstrong World Industries, Inc Dynasound inc, Miliken and co; Steelcase inc 2005) Noise masking systems are commonly used to artificially increase the ambient noise level in a particular area to provide a background noise “ Mask “ to aid speech privacy. They work by providing a constant, low level background noise and are particularly suitable for use in areas where confidential conversations are required (such as within meeting rooms) but where the sound insulation between the noise sensitive areas and the area outside is not adequate. Introducing a source of steady ambient noise to the area outside of the sensitive space can significantly improve speech privacy but due to the broadband white noise nature of the sound used does not cause worsening speech intelligibility as “ irrelevant speech disrupts memory when task load is high, compared to noise at the same volume “ (Evans & Johnson, 2000). In addition, studies have shown that intelligible speech is more distracting than unintelligible speech or sounds with no meaningful content (Sundstorm, Town, Rice, Osborn, Brill 1994) The design of a noise masking system is particularly critical as it effectively introduces a new source of noise into an area which could, if incorrectly designed, provide a source of distraction. Noise masking systems should therefore be designed within the context of each particular space, particularly taking into account the absorptive properties of each area

With no floor to ceiling barriers or doors to attenuate the sound transmission, problems with noise prevail in typical open plan office environments, unless absorbed or contained by acoustically treated partitions or ceiling or masked by ambient sounds (Navai & Veitch, 2003)

CONCLUSIONS

A review of recent scientific studies has confirmed that excessive noise in office environments can be a source of disruption, stress and ultimately a decrease in the productivity to office workers, however this can be mitigated by proper acoustic design to support both individual and team workspace acoustic requirements. For the majority of cases, a good acoustic solution will include all components of ABC. In addition, consideration should be to space planning and layout to ensure that there is no conflict between areas with different acoustic requirements associated with the communication and concentration that forms the main tasks in an office environments.

Fabric & Trim Finishes

FABRICS

Group A	Group B	Group C
Camira Cara	Camira Lucia	Camira Nexus
Bradbury Screen 66	Camira Racer	Camira Blazer Lite
	Camira L2	
	Camira Sonus	
	Bradbury Galaxy	

TRIM COLOURS

Product Name	Code					
Binary	1.1	Silver Ral 9006	Dark Grey	Light grey	Black	White
Sphere	1.2	Silver Ral 9006	x	x	x	White
Element	1.3	Silver Ral 9006	x	x	x	x
Hubble	1.4	Silver Ral 9006	Dark Grey	Light Grey	Black	White
Pixel	2.1	Silver Ral 9006	Dark Grey	Light Grey	Black	x
Axis	2.2	Silver Ral 9006	Dark Grey	Light Grey	Black	x
Flare	2.4	Silver Anodised AA5	x	x	x	x
Galaxy	3.2	Silver Anodised AA5	x	x	x	x
Contour	3.3	Silver Ral 9006	Dark Grey	Light Grey	Black	White
Cozmic Zip	3.6	Silver Ral 9006	Dark Grey	Light Grey	Black	White
Atmosphere	4.2	Silver Anodised AA5	x	x	x	x
Planet	5.2	Silver Anodised AA5	x	x	x	x
Noticeboards*		Silver Anodised AA5	Dark Grey	Light Grey	Black	White
Reception / desks		Silver Anodised AA5	x	x	x	White

*0.1 Noticeboards are also available in Oak, Beech & Maple Frame

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