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# CREATING ENVIRONMENTALLY AND PEOPLE FRIENDLY OFFICES

Almost seventy percent of the U.S. workforce - approximately 89 million persons - work in non-industrial, non-agricultural, indoor work settings, referred to as indoor environments. In the last 20 years, diseases and health complaints related to these indoor environments have received greater attention. 'Indoor environmental quality' refers to the interactions among many factors in indoor environments, including the quality of the air (e.g. air flow, chemical or microbiological agents), physical conditions such as temperature and humidity, ergonomic factors, and socio-psychological stressors or work organisational factors. [1] According to the U.S. Environmental Protection Agency, Americans spend on average 90 percent or more of their time indoors. The same can be said for Canadians.

During the 1970s, following the North American energy crisis, office buildings had been increasingly designed for energy conservation purposes. Often to the detriment of the inhabitants, designers strove to maximize the use of climate control and other technologies to primarily reduce the costs associated with energy use. Most building designers now agree that we appear to have gotten it terribly wrong.

In indoor environments alone there have been a plethora of new physical hazards that have emerged as a result of our changing work environment and the introduction of new office technologies. This is why office design is viewed as one essential key to enhanced productivity.

> *Designers have to be very careful about what they want to maximize in their particular environment. If they're looking to maximize idea generation, communication and just a general feeling of social well-being, then open-concept offices would be the better way to go. If you're talking about trying to get people to do individual tasks ... it's in those situations in which you'd like to have people in a more isolated environment, which facilitates efficiency.* — Dr. Tim Welsh, Assistant Professor, Faculty of Kinesiology, University of Calgary [2]

Today, there is a whole new emerging movement devoted to what has become known as 'green building" design. Perhaps the advent of green building design represents an opportunity to get it right so as to better promote environmentally and people friendly offices.

## *Potential impact of advances in Green Building design*.

In North America, the U.S. Green Building Council (USGBC) is leading the way in the promotion of green building design. According to the USGBC, the benefits of green buildings are:

Environmental benefits:

- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

[1] National Institute for Occupational Safety and Health website page on *Indoor Environmental Quality*: http://www.cdc.gov/niosh/topics/indoorenv/

[2] Office design key to productivity: Derek Sankey, The Calgary Herald, April 09, 2008

Economic benefits:

- ☞ Reduce operating costs
- ☞ Enhance asset value and profits
- ☞ Improve employee productivity and satisfaction
- ☞ Optimize life-cycle economic performance

Health and community benefits:

- ☞ Improve air, thermal, and acoustic environments
- ☞ Enhance occupant comfort and health
- ☞ Minimize strain on local infrastructure
- ☞ Contribute to overall quality of life [3]

In March 2008, the U.S. General Services Administration (GSA), responsible for over 8,600 owned and leased buildings across the U.S., established the Office of High-Performance Green Buildings. The mission of this new Office is to provide high-performance green building information and disseminate practices, technologies and research results through outreach, education, and the government-wide provision of technical assistance. According to the GSA, a high-performing building is described as one that uses less energy, consumes fewer resources, reduces its carbon footprint, and also **maximizes human health and productivity.** Using emerging technology and cutting-edge design techniques, the GSA program includes features such as natural ventilation in favorable climates, which can eliminate the need for heating or air conditioning, and sensor-controlled day lighting, which can lower energy costs associated with heating by using sunlight instead. According to the new Office, both fresh air and natural light have proven to have positive effects on employee morale and performance. [4]

## *What elements of office design should organizations take into account?*

While the focus of green building has generally been on the environmental and technology design side of things, there is nevertheless an important need to consider the positive and negative impacts of current and future office design on the inhabitants. Such elements include impacts vis-à-vis:

### Indoor Air Quality

Energy conservation needs and the impact of climate change on external conditions suggest that buildings will most likely continue to be sealed from outside environmental influences for the purposes of interior climate control. In turn, this suggests that the issues of indoor air quality (IAQ) and 'sick building syndrome' will continue to be of great importance.

> *… it is rarely possible to prove that these symptoms are related to a particular indoor air contaminant. In fact, building occupants are simultaneously exposed to a wide range of indoor air contaminants. IAQ problems result from interactions between building materials and furnishing, activities within the building, climate, and building occupants. IAQ problems may arise from one or more of the following causes:*
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> - *Indoor environment - inadequate temperature, humidity, lighting, excessive noise*
> - *Indoor air contaminants - chemicals, dusts, moulds or fungi, bacteria, gases, vapours, odours*
> - *Insufficient outdoor air intake.*
>
> — Canadian Centre for Occupational Health and Safety [5]

In offices, as well as in homes for that matter, a variety of materials, equipment and accessories may be sources of formaldehyde and other volatile organic compounds (VOC). VOCs are chemicals used to manufacture and prepare many building materials, interior furnishings, textiles, office equipment,

[3] USGBC Web Page: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1718
[4] Going Green: Creating environmentally friendly federal workplaces: Washington Post, Tuesday, March 2, 2010
[5] Canadian Centre for Occupational Health and Safety Website, OSH Answers, January 2004: http://www.ccohs.ca/oshanswers/chemicals/iaq_intro.html

cleaners, personal care supplies, and pesticides. 'Volatile' is a term meaning that these chemicals evaporate, or easily get into the air at room temperature. This is why they are especially an indoor air concern. Studies by the U.S. Environmental Protection Agency and other research bodies have found that VOCs are common in indoor environments and that their levels may be ten to thousands of times higher indoors than found in outdoor air. There may be anywhere from fifty to up to hundreds of individual VOCs in an indoor air sample. Green building design must therefore include employing the use of building materials, interior furnishings, natural cleaners and solvents, and equipment which would reduce or eliminate the potential for VOCs in the work environment.

In addition, adequate air circulation and replenishment must be accommodated by the building's heating, ventilation and air conditioning (HVAC) components. Obviously, the fresher the air the better for those breathing it. Good air circulation will help to reduce the impact of any VOCs and avoid a reoccurrence of what in the mid-Seventies and early Eighties became referred to as 'sick building syndrome', 'tight building syndrome' or 'building-related illness'.

### Lighting

Most of us would agree that there are real benefits to having natural light sources around office and home spaces. Green buildings can be better designed to make good use of external light sources through new window shade and glass materials. These would adapt to exterior lighting changes, while in turn help to more efficiently heat or cool the building's interior.

In terms of artificial lighting, the onus of conserving energy has led to the introduction of improved fluorescent lighting fixtures. Proper lighting makes all work tasks easier, whether in office or industrial settings. People normally receive about 85 percent of their information through their sense of sight. Appropriate lighting, without glare or shadows, can reduce eye fatigue and headaches. Over time, continued exposure to inappropriate or inadequate lighting can lead to more chronic vision problems and deterioration in the ocular system. On-going adjustments between integrated natural and artificial lighting sources have to be well managed. In cases of an aging workforce, it is even more important that proper lighting is provided. Offices and other facilities need to be appropriately designed and illuminated to accommodate the vision needs of workers in general, but older workers in particular.

### Noise

Remember when people in offices used to work in separate enclosed offices, providing them with a certain degree of privacy and less exposure to distractions and noise. Well, all that changed with the introduction of modular office design and new office technologies. The open-office concept and new telecommunications may have been great for increasing employee interaction and accessibility and reducing some accommodation costs, but it also had the unfortunate side-effect of increasing people's exposure to all sorts of noises — often referred to as 'white noise'. Of course, if experience is an indication, a lot of the development of open-office concepts of stacking people almost on top of one another probably had more to do at the time with the economics related to cost and space savings.

A 1996 study by the American Society of Interior Designers (ASID) found that 70 percent of office employees felt their productivity would increase if their offices were less noisy. Unfortunately, a follow-up study of business executives found that they were unaware of noise problems in the workplace, and, in fact, 81 percent appeared to be unconcerned about office noises. [6]

Generally, researchers suggest that certain things can be done to reduce white noise by ensuring that:

- ☞ adequate spacing is provided between work stations;
- ☞ office equipment like printers, fax machines and photocopiers are isolated from working areas;

[6] *Sound Solutions: Increasing Office Productivity Through Integrated Acoustic Planning and Noise Reduction Strategies*: (American Society of Interior Designers, Professional Paper, 1996)

- ☞ machines are located in areas where the effect of noise will be minimal, preferably in a separately insulated, enclosed and properly ventilated work area or room;
- ☞ screening photocopiers or printers with sound absorbent material or panels and other sound masking systems; and
- ☞ the HVAC components are maintained and run as quietly as possible.

Most of these measures normally are not very costly to implement and maintain. Hopefully, such measures would incrementally improve the noise situation in the majority of workplaces. Just ask the workers?

By better dealing with office noise through integrated planning and implementation of interior design solutions to reduce noise levels, organisations could potentially increase worker productivity while reducing possible adverse health effects.

> *The incorporation of appropriate strategies and products for reducing noise in the workplace will continue to be an important part of designing and creating work environments where productivity is supported and enhanced. Indeed, if the past is any indicator, the incorporation of sound acoustical principles of design into work environments will be even more important in a future business climate where competition is even more keen, productivity more valued, and privacy more difficult to achieve and sustain in the midst of developing information and communication technologies dependent on the human voice.* — American Society of Interior Designers [7]

### Interior Design

Today's interior designers are challenged by finding the underlying causes for why humans respond to different spaces in different ways. Increasingly, research is exploring the environmental factors that influence people's perception of space and how designers can more positively have an impact on human feelings and perceptions in the physical environment. Such research provides tools to help designers evaluate perceptions, meanings and definitions surrounding the design of a space.

### Building Materials, Construction and Fire Codes

Of course, it goes without saying that even green building design must comply with all jurisdictional building (incl. HVAC) and fire codes that apply to them. Organizations need to be aware of current code requirements when doing any renovations or upgrades to their facilities.

### *Recommended Reading:*

- ♦ *Visual Quality by Design:* Dr. Jack L. Nasar, American Society of Interior Designers and Haworth Inc., March 2008
- ♦ Indoor Air Quality – Canadian Centre for Occupational Health and Safety

### *Recommended Web Sites:*

- ♦ Indoor Environmental Quality – National Institute for Occupational Safety and Health: http://www.cdc.gov/niosh/topics/indoorenv/
- ♦ U.S. Green Building Council: http://www.usgbc.org/
- ♦ Indoor Air Quality Association: http://www.iaqa.org/
- ♦ American Society of Interior Designers: http://www.asid.org/
- ♦ Canadian Interiors: http://www.canadianinteriors.com/
- ♦ BuildingGreen.com: http://www.buildinggreen.com/
- ♦ Morgan Lovell (UK) – Sustainable Office Design: http://www.morganlovell.co.uk/sustainability/

[7] American Society of Interior Designers: Op. Cit.