

Poor air quality – Its implications on health and performance

In the last couple of decades there has been an increasing concern as to the effects of indoor air quality on health. Building design has changed in order to improve both operating costs and energy efficiency, but this trade-off has resulted in more airtight structures with lower ventilation rates. Whilst this is a positive development in itself and has led to both more comfortable and 'green' buildings, it could also lead to higher concentrations of pollutants like smoke and odours, volatile organic compounds (VOCs), allergens, combustion products and pollutants emitted from building materials.

We now spend an increasing amount of time indoors. A study estimated that the average time spent indoors to be 88% in the US. At the same time, researchers have found the concentration of indoor pollutants to be considerably higher than that found outdoors. Whilst this does not necessarily equate to more exposure to harmful substances, it would suggest that the effect and subsequent health implications are more likely if the majority of our time is spent within a building with poor quality or harmful air.

One of the sources of poor indoor air quality can also be attributed to the extraction of pollutants from outside the building. Modern day HVAC systems do very little to provide buildings with good quality air and these systems use, with very few exceptions, passive filtration technologies that are both costly and inefficient. As a result of these system designs there is the potential for high levels of harmful micro-organisms to be potentially drawn in from the outside and subsequently delivered into a more concentrated environment.

The concentration of indoor pollutants depends on the following relationships:

- **Volume of air contained in the indoor space**
- **Rate of production or release of the pollutant**
- **Rate of removal of the pollutant from the air via reaction or settling**
- **Rate of air exchange with the outside atmosphere**
- **Outdoor pollutant concentration**

Despite this knowledge it is difficult to measure and quantify actual human exposure.

What is slightly easier to document are the implications on health and performance that are caused by poor air quality. The most common health issues related to poor air quality are dryness and irritation of the eyes, nose, throat and skin, headache, fatigue, shortness of breath, hypersensitivity and allergies. In the long run, these symptoms can lead to serious medical conditions like asthma and various syndromes e.g. 'sick building syndrome'. Furthermore, they can also lead to an increase in employee absence, which again can have damaging effects on the companies operating within such buildings.

A further implication is the reduction in performance and productivity amongst employees in poor quality air environments, and several extensive studies document this in various ways. One proved a 4% increase in typing rates after removal of VOCs from a carpet within an office space. Another found a 10% increase in call centre talk times after a similar experiment, which were all done on un-informed subjects that made no complaints on air quality prior to the experiment. The National Institutes of Health (US) also found the impact of poor indoor air quality on office work performance can be as high as a 9% loss in productivity.

When you consider the fact that 90% of the total operating cost of a commercial office building goes into the salaries of the people employed there, a simple change like improving the ventilation can yield substantial dividends. A Swedish study found that a 1% improvement in employee productivity was enough to offset the increased cost of proper ventilation.

So, what if we told you there is a highly cost effective and incredibly efficient solution to all the problems mentioned above, would you be interested?... If so please call us to discuss.