

CIR Built Environment

While many focus on “Greenhouse” gas emissions and the effect of global warming on our environment, few have recognised the implications and emerging threats to the “Built” environment.

Changes in regulations, standards, living style, construction techniques coupled to novel materials are now seen to be having significant effect on building occupants!

Building materials and techniques have significantly changed over the past thirty years and a move towards chalk and paper construction (plasterboard or Gyprock) means moisture is now generally adsorbed instead of being removed. The application of non permeable wall coverings and paints seals the problems in and the ubiquitous mould develops in ideal conditions within wall cavities and ventilation systems.

The development of non toxic paints and reduced levels of VOCs *volatile organic chemicals* has removed another defence against the development of mould and the reduction in sulphur emitting fuels means that the mould spore and fungi have few of the historic challenges to prevent its growth.

While changing building regulations, materials and construction techniques are responsible for many of the health and environmental problems which have developed, designers, architects and builders may shoulder shared responsibility too. Many have failed to assess the implication of climate change and the movement in Europe from a generally heating climate to that of a cooling where air conditioning may be essential in some months of the year.

Inspection of new mouldy commercial buildings has shown vapour barriers were designed and installed at the wrong side of a thermal break and extensive trapped condensation caused significant damage. Timber frame design which now can accommodate 8 floor construction levels must rely on the skill and competence of a building trade who have replaced tradesmen with people that simply overlay paper “Tyvek” for environmental controls and tape joints and mastic gaps for environmental controls.

Mould

Recent building investigation of four separate buildings was undertaken where toxic mould had been recognised as a potential cause of death, a diagnosed symptom of severe illness and infection, a possible contributory factor in liver disease and the possible cause of lung cancer. Significant points in the investigation were that none of the buildings were more than four years old, none had suffered flood or leak and all had been built to recognised standards.

The design of the buildings coupled to construction materials caused the problems and while builders and architects may dispute who is to take responsibility, the major cause appears to be compliance to “Building Regulations” The rise in asthma can generally be plotted in parallel to the rise in the government’s requirement for energy efficient buildings which revolved around betterment of insulation. The improvement of U and R values, coupled to reduced ventilation rates the measurement and control of leakage (part L building regulations) have seen tight box construction. General living or working conditions result in the production of water vapour in the form of increased humidity. Vapour generation is the result of breathing, cooking, boiling kettles and even dehumidification where the temperature differentials of internal or external or processed air results in “Dew Point” being reached because of thermal differences. Dew point is where the air releases the moisture it did carry because it has cooled to a point where it no longer has the energy or capacity to carry it and is usually seen as condensation. In older buildings condensation was usually removed by ventilation but reduced ventilation means that the moisture is adsorbed into building materials.

Water damage and flooding may trigger mould growth but insurers could be seen as the major cause of proliferation. From audits and inspections of thousands of buildings we have found that following the hurricane

Katrina, New Orleans had little or no mould growth, yet in Miami it was extensive. The Tsunami which affected Thailand and Indonesia resulted in little or no mould although Carlisle in NE England had extensive mould growth. The major factor in mould growth in all audits was the presence of insurance cover coupled to poor claims control and non-existent mitigation or competent drying.

Indoor Air Quality

The cost of warming or cooling the buildings air is a significant factor and it has generally been accepted that reducing the fresh air exchanges is a significant cost saving. Although air changes within a building may be as high as 6 per hour, the reality is that the air may only have been moved 6 times with less than 5% new air coming into the building. Poor circulation may mean that in dead spots the air is hardly ever changed and toxin and CO² levels may increase and significantly affect the workers ability to function. Poor concentration, lethargy and increased absenteeism are usual symptoms associated with SBS *sick building syndrome* which increasingly is called "Tight Building Syndrome" While the short term economic advantages may have been identified the long term cost may be more difficult to assess. Typically the ventilation system of most commercial buildings are fitted with cooling coils, these have increasingly become smaller and are now impossible to clean. The gaps between the cooling fins are so small that mould growth develops and not only produces mycotoxins which may affect the health of building occupants but actually significantly raise the operating cost due to air flow restriction. Simple cost effective solutions such as UV light can not only prevent and remove mould growth but actually reduce running costs and provide a far healthier environment.

Disease

The emergence of antibiotic resistant disease and potential for pandemic or bird flu must now focus attention on the protection of occupants and employees. While risk managers have completed forms and made assessments of likely disruption the reality is that few if any have actually assessed how to mitigate or eliminate the threat. The analogy of a buildings and a greenhouse or grow bag must be made and significant changes must be made in the built environment if epidemic is to be controlled and absenteeism reduced. Antimicrobial coatings are now available which kill bacteria on all surfaces touched, a significant defence in cross contamination.

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