INDOOR AIR QUALITY

# Wireless Monitoring for a **Safe Indoor Environment**

Indoor Air Quality (IAQ) is a significant issue in ensuring the health, safety and well-being of employees and the public. **Gareth Evans**, from portable gas detection and IAQ monitoring instrumentation manufacturer **PPM Technology**, discusses how a wireless system for monitoring the indoor environment enables a controlled approach to the management of IAQ to be taken.



Indoor air quality relates to a number of environmental factors inside a building that can impinge on the health, comfort, or work performance of the building's occupants. Monitoring the quality of the air inside a building is an essential requirement, since it is estimated that the average person spends 90% of their time breathing 'indoor air'.

Poor air quality is a contributing factor to both short and long-term health issues, which can lead to decreased productivity, absenteeism, and in some cases possible litigation. Common symptoms associated with poor indoor air quality can include eye, nose, and throat irritation, headaches, nausea, dizziness and fatigue with, in some cases, these symptoms developing into acute, or even chronic, respiratory illnesses.

Gas and particulates in the air are the principal sources that contribute to an unhealthy indoor atmosphere. Common factors that can contribute to a harmful environment include inadequate ventilation, poorly maintained HVAC systems, non-vented gas heaters, airborne pollutants, carpet fibers, fungal spores, vehicle exhaust emissions, building materials, furniture, chemical pollutants (light industrial chemical substances, cleaning substances) and ozone emissions from printers and photocopiers, etc. Another contributing factor in recent years that has created problems are energy conservation measures that have led to airtight building construction.

Indoor air quality and conditions such as sick building syndrome (SBS) are a major concern to businesses, building managers, tenants and employees because it can impact the health, comfort, well being and productivity of the building occupants.

Conventional air quality investigations and examinations consist of taking single point measurements of pollutant levels. However, this monitoring method is unreliable as the pollutant levels are subject to hourly, daily and, indeed, seasonal fluctuations so that building service professionals and designers alike have long regarded these methods of measuring indoor air quality as being inadequate, considering today's environmental challenges. Now, though, advances in technology have made it possible for a wireless system to continuously monitor indoor air quality. Such a system enables the simple continuous detection and measurement of many of the factors that contribute to a building's indoor environment, for example temperature, humidity and a number of toxic gases and compounds including carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide, ozone, ammonia, formaldehyde and total volatile organic compound's (TVOC's). Controlling these IAQ parameters would improve the comfort and work efficiency of the occupants as well as their immediate and longer term health.

Audible and/or visible alarm warnings of the presence of harmful gases in the air are automatically triggered, thus protecting employees and the public. Such alarms enable buildings to be immediately evacuated, thus reducing the building occupants' risk of exposure to harmful air born gases or particulates to a minimum. A wireless sensor network also has the advantage of being able to carry out detailed monitoring in inaccessible locations, where it is not viable to install a wired infrastructure.

Networks can easily be extended by simply adding dedicated repeater nodes or additional wireless units (each unit with a unique sensor specification if necessary), which means that by continuously monitoring the interior of a building a detailed profile of the indoor environment can be built up. In addition, analysis of the recorded data through dedicated software allows for more efficient management of resources and energy. The software can be used as an analytical tool to identify trends and to rectify problem areas, which should lead to safer and more comfortable working environments. For example, if the building service engineer has the correct data relating to the day-to-day operation of the air conditioning system, improvements to the design and management of this and the ventilation system can be made which can significantly improve energy consumption and reduce running costs. In addition, a more effective air-conditioning or ventilating system has a positive impact on the environment, ensuring ensure optimum human comfort and contributing to the health and well-being of those working in, or visiting, the building.