AppliedSensor
Intelligent air quality... beyond CO_2

Application Note: Improving Indoor Air Quality in Restrooms

One room notorious for unpleasant odors is the commercial restroom. In most cases, these odors are due to the presence of a significant amount of human bio-effluents (mainly methane and hydrogen).

Businesses that appeal to a discerning clientele, such as upscale restaurants and hotels, must be especially vigilant about the condition of their lavatories. A malodorous restroom can reflect poorly not only on the image of the facility, but on the entire company as well.

Some proprietors and facilities managers address this problem by installing air quality monitors activated by sound or motion to control ventilation. Unfortunately, these monitors can actually increase energy costs, as fans don't necessarily need to run whenever the restroom is occupied. Plus, motion-detectors can signal lights to turn off, inadvertently stranding a stationary patron in a dark room.

Another type of air quality monitor signals fans to operate when a large amount of carbon dioxide (CO_2) is detected in the air. However, these CO_2-based monitors cannot detect unpleasant odors often found in a restroom.

Intelligent Air Quality Beyond CO2

In comparison, AppliedSensor's iAQ-2000 Indoor Air Quality Module detects a broad range of volatile organic compounds (VOCs), such as bio-effluents, smoke, cooking odors and cleaning supplies, while correlating directly with CO_2 levels in an indoor environment.

Figure 1 shows the sources of the most common chemical groups of mixed gases found in indoor air. These gases can be released into a facility's air from building materials, furnishings, equipment, adhesives and human metabolism. According to the Environmental Protection Agency, VOCs are two to five times more likely to be found inside enclosed environments than outside.

The iAQ-2000 Indoor Air Quality Module operates by signaling fans to turn on when VOCs are present, and off when air quality returns to normal. The module includes features such as low power consumption and auto-calibrating sensing technology. The iAQ-2000 can also reduce utility costs and optimize proper ventilation, thus ensuring the highest air quality in commercial restrooms.

Figure 1 – Examples of VOCs and Sources

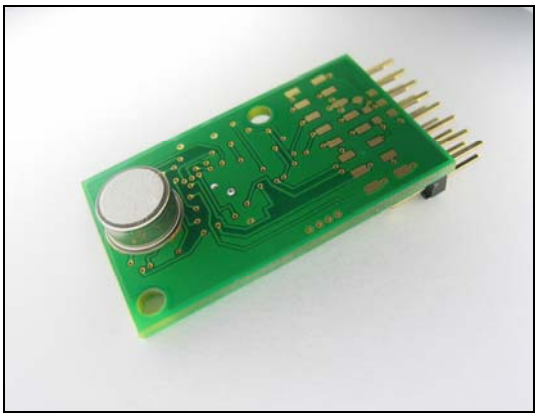
Substance Group	Example	Sources
Alkanes	heptane, methane	human breath, bio-effluents
Alcohols	alcohol, mineral spirits	cleaning supplies
Aldehydes	formaldehyde	building materials
Ketones	butanone	paints
Esters	methyl acetate	glues
Terpenes	pinene	glues
Aromatics	xylol	paints and glues

Commercial Restroom Installation

AppliedSensor's iAQ-2000 Indoor Air Quality Module was installed in a commercial restroom's HVAC system to monitor air quality and control fan speed. For comparison, an infrared-absorption CO_2 sensor logged the concentration of CO_2. Figure 2 compares the data collected from the restroom, confirming that the concentrations of predicted and measured CO_2 were consistent.

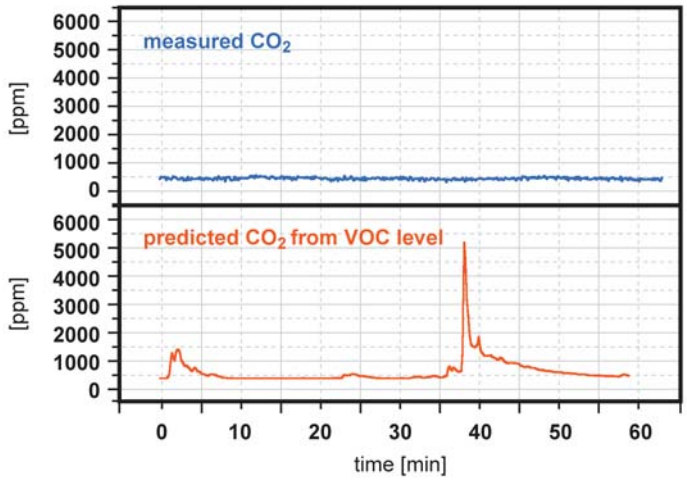
These measurements demonstrate the advantage of VOC sensors in odorous environments where CO_2 sensors fail to serve as indicators for poor air quality.

Equipped with a micro-machined metal oxide semiconductor (MOS) sensor element, the iAQ-2000 alerts the restroom's climate control system to increase ventilation within seconds of detecting threshold levels for target gases. Once VOC levels are minimized, ventilation is decreased.



iAQ-2000 Indoor Air Quality Module

Figure 2 –Measured CO_2 compared to Predicted CO_2 from Restroom VOC Levels



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