

# WHY MONITOR DUST IN THE WORKPLACE?

**Almost any place of employment can present a potential threat to health and safety from airborne particulates and aerosols. It is important to note, however, that dust hazards are not necessarily visible to the human eye and that the finest particles can represent the greatest threat because of their ability to travel deepest into the lungs. Effective monitoring is therefore key to the implementation of an effective risk management strategy.**

There are two major reasons for monitoring dust in the workplace; to enable air quality management, and for regulatory compliance. The immediate effects of dust can be irritation to eyes, headaches, fatigue, coughing and sneezing. As such, poor indoor air quality can lower employee performance and cause increased absenteeism through sickness. In addition, particulates are known to create long-term deleterious effects, contributing to serious illnesses. In combination with outdoor exposure (to pollution from vehicles for example), the Government has estimated that 29,000 premature deaths occur in the UK every year as a result of particle pollution. This means that, particularly in urban areas, natural ventilation may not necessarily improve indoor air quality.

Employers are responsible for ensuring that staff and visitors are

not exposed to poor air quality in the workplace, so it is necessary to conduct monitoring. Accurate and effective monitoring data can be used to check exposure levels and to help identify safe working practices.

Monitoring also helps to demonstrate compliance with relevant regulations. COSHH is the law that requires employers to control substances that are hazardous to health. According to the Health & Safety Executive (HSE), employers can prevent or reduce workers' exposure to hazardous substances by finding out what the health hazards are; by deciding how to prevent harm to health; by providing effective control measures; by providing information and training; by providing monitoring and health surveillance, and by planning for emergencies.

In order to evaluate workplace safety, monitoring data is compared with Workplace Exposure levels (WELs) which prescribe the maximum exposure level to a hazardous substance over a set period of time. Failure to comply with COSHH and WELs can result in financial penalties, prosecutions and civil claims.

Indoor air quality is affected by both internal and external factors. Air pollution may arise from external sources such as neighbouring factories, building and development activities, or from vehicles – especially those with diesel engines. Internally, air quality is affected by working practices and business processes. For example, dust may arise from raw materials such as powders, or it may be produced by processes that generate particulates; including dust, mist, aerosols and smoke. In all cases, internal and external, it is important to identify both the source and the seriousness of the problem, so that appropriate and effective mitigation measures can be implemented. These might include, for example, ventilation, process dust prevention, the management of shift patterns, personal protection equipment (PPE) and alarm systems.

## Regulatory Requirements to Monitor

Under the Workplace (Health Safety and Welfare) Regulations 1992, employers have a legal duty to ensure, so far as is reasonably practicable, the health, safety and welfare of employees. Furthermore, the Management of Health and Safety at Work Regulations 1999 require employers to assess and control risks to protect their employees. A key element of this is the requirement to comply with the COSHH Regulations. The HSE says that exposure measurement is required:

- For COSHH assessment, to help select the right controls
- Where there is a serious risk to health from inhalation
- To check that exposure limits are not exceeded
- To check the performance of exposure controls
- To help select the right respiratory protection equipment
- To check exposure following a change in a process
- To show any need for health surveillance; or
- When an inspector issues an 'Improvement Notice' requiring monitoring

The COSHH Regulations include dust, mist, vapour, fumes and



chemicals, but they do not cover Lead or Asbestos. Specific requirements exist for certain industries such as construction. Generally, WELs relate to particulate diameter because the health effects of particulates are heavily influenced by their size.

Inhalable dust is that which enters the nose or mouth during breathing and is available for deposition in the respiratory tract. It includes particles with a width between 2.5 and 10 microns ( $PM_{2.5}$  –  $PM_{10}$ ), and the WEL for this fraction is  $10 \text{ mg/m}^3$  as an 8-hour Time Weighted Average (TWA).

Respirable dust is the fraction that penetrates deep into the gas exchange region of the lungs. It includes particles with a width between 1 and 2.5 microns ( $PM_{1-2.5}$ ), and the WEL for this fraction is  $4 \text{ mg/m}^3$  as an 8-hour TWA. Lower specific WELs exist for particulates that present a greater threat to health. For example, Silica dusts have a WEL of just  $0.1 \text{ mg/m}^3$  respirable dust as an 8-hour TWA.

## The Costs of Non-Compliance

In addition to the enormous numbers of premature deaths that result from exposure to outdoor air pollution, there are also numerous well-documented instances demonstrating the harm caused by exposure to indoor pollution from dust, smoke, aerosols and vapour. For example, a 46-year-old cook developed breathing problems after working with flour in a school kitchen with poor ventilation. Her breathing problems became so severe that she could hardly walk and had to sleep sitting up. She became severely asthmatic and had to retire early on health grounds. With the support of her Union she made a compensation claim on the basis that decent working conditions were not provided, and the council admitted that it had not taken sufficient action despite repeated complaints. Consequently, the courts awarded the cook £200,000 in damages.

In another example, between 1995 and 2004, a solderer was exposed to rosin based solder fumes and suffered health deterioration and breathing problems including asthma. An investigation conducted by the HSE found that the company did not have adequate control measures in place and failed to install fume extraction equipment. Furthermore, the company did not employ rosin-free solder until December 2003, despite an assessment having identified the need in 1999. The company was subsequently fined £100,000 with £30,000 costs, a punishment which attracted both local and national media attention.

## Monitoring Dust

A wide variety of methods exist for the measurement of dust, and the choice of equipment is dictated by the application. For example, it is obviously important to employ a technology that is able to measure the particulates that will be present. In addition, it will be necessary to determine whether monitoring should be continuous, at a single point, or whether portable instruments are necessary to check multiple locations. Monitoring might be conducted in a work space, or personal sampling might be undertaken in order to assess the exposure of an individual over an entire shift.

Personal Sampling Pumps represent the preferred method for workplace exposure monitoring where it is necessary to demonstrate regulatory compliance or where legal dispute is a possibility. An HSE document (MDHS 14/4) provides workplace exposure monitoring guidance for collecting respirable, thoracic and inhalable aerosol fractions. The samples collected by this process are analysed in a laboratory, which means that chemical analysis is also possible. However, the sampling method incurs a delay and incurs extra cost.

In response to the wide variety of applications and monitoring

requirements, Ashtead Technology stocks a comprehensive range of monitors for both sale and rental, providing customers with complete financial and technical flexibility. As a TSI Gold Partner, Ashtead Technology provides a comprehensive range of maintenance and calibration services; helping customers to ensure that their monitoring equipment remains in optimal condition. Ashtead's fleet of rental equipment includes large numbers of the latest TSI instruments, supported by the highest levels of service and technical assistance. Employing advanced light-scattering laser photometers, the TSI products are supplied with a calibration certificate and provide real-time, direct-reading aerosol monitoring and analysis of different particulate fractions in workplace, cleanroom, HVAC, fugitive emissions and environmental monitoring applications.

The TSI range of dust monitors is continually being developed to bring new levels of functionality to the market. For example, the new lightweight AM520 Personal Dust Monitor is able to measure and log  $PM_{10}$ , Respirable ( $PM_{4}$ ),  $PM_{5}$  (China Respirable),  $PM_{2.5}$ ,  $PM_{1}$  or  $0.8\mu\text{m}$  Diesel Particulate Matter (DPM), providing real-time audible and visual alarms, and running from a rechargeable battery for up to 20 hours. For outdoor applications, the MCERTS approved Environmental DustTrak is web-enabled, providing a quick and easy dust monitoring solution for applications such as building and development projects.

For more information on the latest instruments and on the range of parameters that can be measured, visit the Environmental, Health & Safety section of [www.ashtead-technology.com](http://www.ashtead-technology.com).

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