# Dust Monitoring and Control in the Workplace

## Dampening dust risks

No one wants a dusty workplace. At its worst, exposure to airborne dust can lead to all kinds of occupational disease, from asthma to lung and nasal cancers. And at the very least, dusty environments are unpleasant and difficult to work in.

If you use dust producing processes — and most businesses in manufacturing, extraction, food processing, engineering and construction will — the first step is to identify these processes, understand the substances involved and look at who is exposed. Under the Control of Substances Hazardous to Health Regulations (COSHHH) it is necessary to assess potential exposure and then decide whether or not the exposure is significant.

There may only be a potential for exposure if not an actual problem, then back that up with measurements. It is only after the measurements have been taken can you make a reasonable judgement about what control measures are needed.

The dust itself might not be an issue, but there may be a toxic component to the dust so always check and use up-to-date safety data sheets. For example, a metal being grinded may have something like nickel or chromium in it, in which case you've got to control to a much greater degree.

## Know the process

Dust exists in a range of sizes. The main fractions are "inhalable", breathed into the nose or mouth; "thoracic", which can penetrate the head airways and enter the airways of the lung; and "respirable", which is most dangerous, and penetrates beyond the terminal bronchioles into the gas-exchange region of the lungs.

For COSHH purposes, any kind of dust is hazardous to health when present at a concentration in air equal to or greater than 10 mg/m³ of inhalable dust or 4 mg/m³ of respirable dust, as measured over the equivalent of an 8-hour day.

Other dusts — such as hard and soft wood, aluminium, flour, talc, cotton, and rubber process — have specific Workplace Exposure Limits (WELs), and many dusts are a mixture of different substances, some of which are covered by the general dust exposure limit and others by their own WEL.

In some cases, just observing processes will indicate whether there is a problem. If it's an inert dust, then 10mg/m³ is a pretty dusty job and it will be fairly obvious. It is likely you have got a problem if there are clouds of dust everywhere, but conversely the size of dust we breath in is largely invisible to the naked eye, making some dust issues less obvious. Sampling is only going to tell you've got a problem, so it's best to put controls in place and do the basics – such as some extraction – and then do some monitoring to ensure you've reduced it to acceptable levels.

In other cases, for something like a pharmaceutical or a metal, with a low exposure limit, it can be very difficult to assess visually, and you really do need to do some sampling first. Airborne dust is the real issue in health terms, not heavy dust lying around a machine, which makes it look dusty.

People also tend to focus on the wrong processes, perhaps the saw, where there is a lot of dust deposited on the floor. But they miss processes that are most likely to produce potentially high exposure, such as sanding or routing, which produce a much finer, inhalable dust.

So it's about knowing your processes, knowing what you're looking for and the types of substances you're using, and then it's about matching your choice of monitoring to that.

## Choosing the method

The HSE's MDHS (Methods for the Determination of Hazardous Substances) series describes specific procedures for sampling and measuring personal exposure to dust based on the long established gravimetric (pre and post sample weight) method.

The MDHS for general dusts is 14/3. So if you don't know what you're sampling for, then start with this. For specific dusts or constituents, there are different methods. The MDHS methods are not the law but guidance alone.

HSE exposure limits are based on personal samples, so to test against these, you need a personal pump, with a sampling head — containing an appropriate filter — set up in the breathing zone, usually the collar.

The same pump can be used for different types of dust sampling, regardless of what you're sampling. The thing that normally changes is the type of filter.

Once you've decided what you're looking for and found a method to work to, the method will state the volume of air to test and how long to run the pump for, and at what flow rate.

At the bare minimum, anyone doing sampling needs to know how important it is to follow the method, and the nitty gritty of handling. Procedures need to be robust, with everyone doing it the same way.

You need to be able to set an accurate flow rate and you need calibration equipment to do that. You've also got to do that before and after each sample, to check it hasn't changed in the 8 hours you've been testing for.

Not having equipment calibrated properly is easy to do and can have serious consequences. For general dust, the MDHS recommends sampling 960 litres running at 2 litres per minute for 8 hours.

So if you haven't calibrated your pump properly and you're only running at 1.7 litres, you'll only end up sampling 800 litres. You'll have under sampled and it won't be representative. It is also important to look after and handle equipment properly. Filters must be stored appropriately – away from a humid environment where they could absorb moisture, which would change their weight, and handled with forceps or tweezers.

If you damage the filter or accidentally rip a bit off, that's going to affect the weight you're supposed to be measuring. With some types of sampling head the filter is in a cassette that goes in the head.

You then weigh the cassette, which stops you handling the filter and stops any dust collected being lost inside the walls of the head itself.

Taking blanks — which involves simply handling and returning a filter from the same batch to act as a control — is another key part of the sampling process that people sometimes miss, or ignore on cost grounds .

It is also important to use a UKAS-accredited laboratory to analyse samples and asking labs if they participate in WASP (the Workplace Analysis Scheme for Proficiency), which tests the performance of labs measuring exposure to hazardous substances in the workplace.

Using air pumps allows measurement against MDHS guidance, but there is another — and complementary — dust monitoring option, which offers real time measurement. Real time monitoring gives you an idea there and then if you've got a problem or not. It will tell you there and then, rather than waiting for a lab result, so you can make changes to your process or dust control measures, and do some new measurements.

One of the downsides of personal measurement is that you might get a high average level from weighing the filter, but this might come from five minutes of huge levels of exposure, especially during batch measuring processes that tend to produce big spikes of exposure.

With real time monitoring, you can leave the device in the area to log how dust levels vary through time, which provides useful information about exactly where the dust problem lies, at what point in the process, and where you need to focus control measures.

## Control hierarchy

In controlling dusts, the usual risk control hierarchy applies:

- eliminate use
- use a safer form of the product, such as a paste rather than powder
- change the process to emit less dust
- enclose the process so that the dust does not escape or extract dust near the source using local exhaust ventilation (LEV)
- have as few workers in harm's way as possible
- provide personal protective equipment (PPE) such as a respirator

The hierarchy is about recognising you can do things at the front end to prevent exposure at other end. If you alter the process or use materials without a toxic component, or in a form that doesn't generate exposure, it's better than having to control the dust.

When it comes to specifying and choosing LEV, you need to know the particle size, the rate it is released, the amount and the type of atmosphere it's released into. All this should ideally be looked at before a system is installed and consideration should be taken into using a specialist LEV installer.

Putting too much faith in LEV systems is a common mistake. You shouldn't assume an LEV system will collect all of the dust, if they are badly designed or not fit for the dust in question then LEV wont be effective.

LEV also has to be practical for people to use. Workers using it may also not understand how to use it properly. They might have been trained a while ago, or were not trained at all, and do not appreciate key principles, such as how close a hood has to be to capture dust.

One of the HSE's concerns is that people sometimes think getting LEV or PPE is the end of the matter. But you need to understand how it controls the exposure and to maintain it and keep it clean. The duty holder who controls it has to realise it's part of the process, not a tack on measure.

The HSE also wants to see duty holders be more questioning of suppliers and expects responsible suppliers to help the customer by enquiring about the process, advising on likely exposure and explaining how their measures can control it.

Instruction and training is critical, often the expectation is that people should just know, but they don't unless you tell them. You may have a good control system, but if people don't appreciate the way it should be applied, it isn't going to work.

Instruction and training is also important in determining how people do the job. Some workers are careful; while others create an almighty mess. If you're spreading flour all over the place, perhaps a different way of doing it – in a more controlled, controlled diligent way — would yield less dust.

Another thing businesses tend to ignore is out-of-hours cleaning and maintenance when the usual LEV might be off, and cleaners, without proper supervision, may use brushes and brooms, which simply spread dust into the atmosphere.

In the hierarchy of control, the last thing you apply is respiratory protection. And often, because of poor understanding of toxicity and dust concentration, the wrong respiratory protection is employed.

A final point is that many businesses forget to reassess their control measures or to carry out new sampling when they alter processes or substances. If anything changes, you should reassess.