Control order

Duncan Abbott *offers a reminder that engineering controls should always come before behavioural ones*

TRYING to control workplace risk, too many people still look first to training, instruction and insisting operators wear personal protective equipment (PPE).

These are administrative controls. They limit workers' exposure to hazards by rules, procedures and instructions, scheduling shorter work times in contaminant areas for instance. In the popular hierarchies of controls, and explicitly in the one favoured by the US National Institute for Occupational Safety and Health (NIOSH) (see box), they are low in the ranking, only a step above PPE provision itself.

Admin controls are rated lower for a reason. They can be difficult to implement and maintain and are not a reliable way to reduce exposure. Occasionally, they can even increase risk; one manufacturer rotated all workers between quiet and noisy jobs in the belief that it would reduce the risk of substantial hearing loss to a few workers. This actually increased the number of small hearing losses in workers who had never reported problems before.

As Duncan Spencer noted in his article on the HSE's Five Steps to Risk Assessment methodology in last month's HSW, the holy grail of eliminating the hazard altogether or substituting it for a lesser one, often isn't reasonably practicable in business. (That said, these options are always worth thinking about creatively and returning to from time to time, as technological developments can make the impracticable practicable while you aren't looking.)

So, where you can't pick a hazard off at the top of the hierarchy, and since you shouldn't go straight to the administrative options, what follows is to concentrate on engineering controls.

Engineering controls place a barrier between the worker and the hazard. The most obvious example is machine guards; others include ventilation systems, sound-damping materials to reduce noise levels and radiation shielding.

Their initial cost can be higher than that of admin controls or PPE, but the level of safety they provide is higher too and, in the event of an accident, you won't have to explain to an inspector why they weren't installed.

In situations where employees will work on or around equipment fitted with engineering controls, you also need the back-up of admin controls in the form of clear instructions that they must not be modified, removed, or otherwise defeated, even where they slow production or lengthen maintenance and repair times.

Case by case

The following examples illustrate how hazards can be controlled at engineering level and show that engineering is a wide

The NIOSH hierarchy

1. Eliminate the hazard by removal from the workplace.
2. Substitute the hazard for non-hazardous product or material.
3. Use engineering controls to reduce the source of exposure, through modification of equipment, installation of guards, or ventilation systems.
4. Use administrative controls by changing working practices and operational procedures. The workers' exposure to the hazard is controlled by a combination of instruction, training, housekeeping and maintenance.
5. Use personal protective equipment (PPE) to control exposure to the hazard.

Source: National Institute for Occupational Safety and Health, www.cdc.gov/niosh/topics/engcontrols

term, in one case extending to simple desk provision.

In a manufacturing company, workers suffer from noise exposure well above the exposure limit value of 87dBA. The company looks at reducing noise at the source and, where this is not feasible, decides to interrupt the noise path by erecting an acoustic barrier, reducing the reverberation by installing sound-absorbing material, and curbing structure-borne vibration with vibration mounts.

In determining whether engineering controls are appropriate, the noise problem has to be carefully defined. Noise levels are measured accurately, along with the workers' exposure. Individual noise sources are identified to determine how each source contributes to the overall level. At this stage, before implementation, engineering controls have to be costed, including the cost of maintenance, upgrading and cleaning.

All staff operating, servicing, and maintaining equipment are involved in the noise-control plan. Staff working with the equipment provide guidance on the positioning of monitoring indicators and panels, lubrication and servicing points, control switches, and the proper location of access doors for safe operation and ease of maintenance. An acoustics engineer is brought in to assist in the design, implementation, installation, and evaluation of the controls.

In another manufacturer's paint spraying department, an assessment of the measures needed to reduce the workers' exposure to noxious fumes finds it isn't possible to substitute the paint for an alternative which creates less vapour without reducing the quality of the coating. Nor is it feasible to completely enclose the operation to prevent exposure.

Where complete enclosure is not feasible, the next level of control is to provide barriers or local ventilation to reduce exposure to the hazard in normal operations. Moving to this level, the assessor decides it's possible to fit a fume hood, a form of local exhaust ventilation, to vent the fumes away from the working area.

Control along the path between the source of the hazard and the worker is also introduced. This consists of more engineering controls through regular ventilation maintenance, plus admin controls of safe working practices, ensuring workers check that the ventilation system is working when the paint spray equipment is in use.

A food processing company carries out a manual handling assessment and introduces a maximum manual lifting weight of 23kg for its order pickers. For any box over the maximum weight, the picker should request help from a "floater" — a colleague free from picking duties.

This administrative control is unsuitable; the pickers each have targets of packing 1200 cases per day, so waiting for a floater slows down their picking speed, and they continue to sustain injuries picking heavy boxes on their own. A simpler engineering control — setting a maximum weight for the boxes at the packing stage — is substituted, taking away the hazard.

First-call technicians for a utilities company respond to reports of gas leaks and can be working from their vans for up to 16 hours a day. Their job is to make safe the leak and then wait for the work crew who carry out permanent repairs. Some first-call workers report upper limb and back pain.

It turns out that the admin control, an information sheet on working on their laptops in the vans, is inadequate. They don't understand how to work properly and so most rest their laptops on the vehicle's steering wheel and input data with their forearms bent back and neck straining forward.

Their initial cost can be higher than that of admin controls or PPE, but the level of safety they provide is higher too

Computer desks and chairs are provided in the backs of each van, and most of the complaints of musculoskeletal pain disappear.

Engineering controls seldom offer a magic bullet, and in many cases, such as machine guarding, need to be backed up by administrative controls to make sure they aren't bypassed. But they can be highly effective and it's worth thinking creatively how they might be used to separate workers from a hazard, before moving on to the administrative options such as work practices and training. n