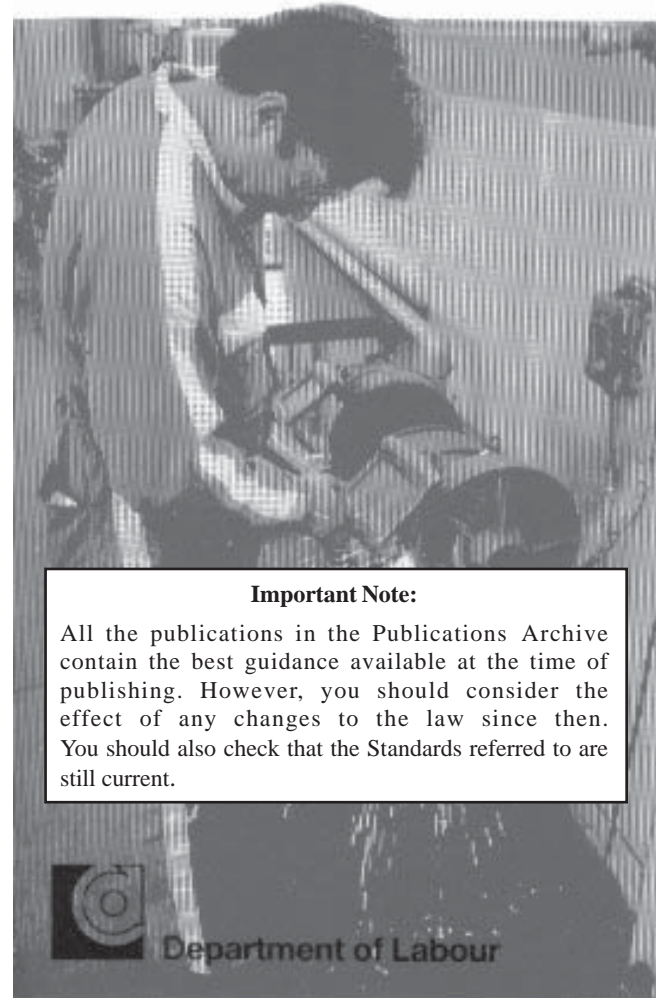

Safety hints for operators of

ABRASIVE WHEELS



Important Note:

All the publications in the Publications Archive contain the best guidance available at the time of publishing. However, you should consider the effect of any changes to the law since then. You should also check that the Standards referred to are still current.



Department of Labour

THE BENCH OR PEDESTAL GRINDER

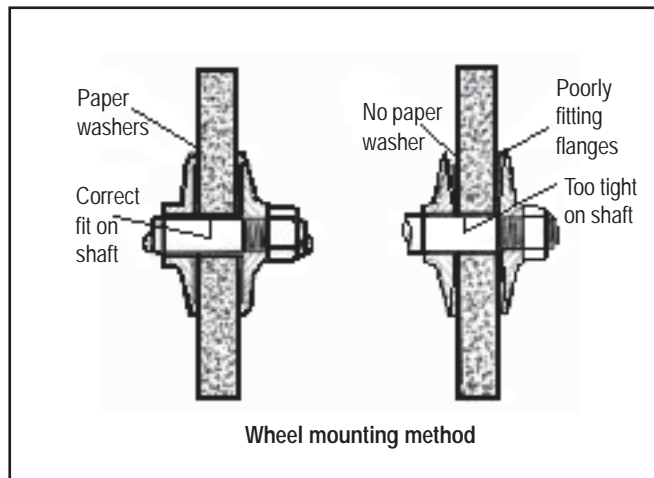
Grinders that use abrasive wheels are an important piece of equipment in most workshops. They are manufactured as both bench mounted and pedestal type in a range of sizes and for different uses. However, they all present similar risks to operators, and these can be overcome by a few simple procedures and work habits.

Whether the grinder you use is of the pedestal or bench mounted type, it should be securely fixed at a convenient working height. Because of the vibration that can occur with grinders, mounting bolts and nuts should be checked regularly.

Before you start make sure you will be using the right abrasive wheel(s) for the job — information about the types of wheels to use for specific jobs is always available from your supplier.

Make sure the wheel is mounted correctly

The wheel should fit the spindle snugly. Never enlarge the hole of a wheel; it shouldn't need to be forced on, nor should it be too loose a fit. There should be paper discs or washers on compressible material and they should be intact; the flanges true; and the tightening of the clamping nut not excessive — just enough to hold the wheel firmly. Also check that the clamping surfaces of wheels, discs or washers, and flanges are in even contact.



Give newly mounted wheels a test run

After you have mounted a wheel, replace the guards and run the wheel for at least a minute with everyone standing clear of its line of rotation. The grinder should be sited so that the line of rotation doesn't face an open doorway, passageway or place where anyone is working.

Avoid excess speed

The centrifugal force generated by rotation of the wheel causes stresses in the bonding and too much stress may cause a wheel to burst.

Manufacturers take care of this by careful selection of materials and controlled methods of manufacture. They also mark on every wheel the maximum number of revolutions per minute for which it is made. Be careful never to exceed the safe maximum — a burst wheel may cause severe injury.

Formula for calculating peripheral speed of an abrasive wheel

To be sure of the safe limits for the wheel, you may need to convert the number of revolutions per minute into peripheral speed:

If N is the number of revolutions per minute of a wheel
D mm in diameter, the approximate peripheral speed (in metres per minute (S)) is given by the formula —

$$S = \frac{22}{7} \times \frac{D}{1000} \times N$$

$$= \frac{D \times N}{318.18}$$

$$N = S \times \frac{7}{22} \times \frac{1000}{D}$$

$$= \frac{318.18 \times S}{D}$$

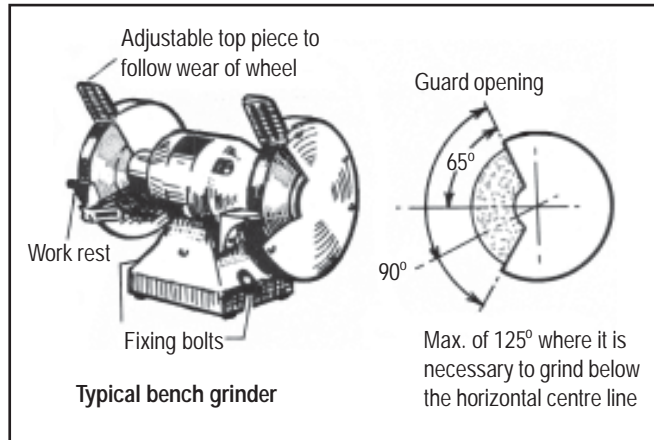
Conversely, if the maximum peripheral speed (S) is known from the label on the wheel or elsewhere, the permissible number of revolutions per minute (N) can be calculated by the formula —

These formulae are accurate enough for practical purposes.

Archive

Always have the guard in position

The wheel should be enclosed by a peripheral band and two side members. They should be securely connected and strong enough to withstand the impact of, and retain the pieces of, the wheel should it break in operation. (Experience has shown that guards of ordinary cast iron or cast aluminium are not effective for containing pieces of a broken wheel.) There should also be an adjustable top piece or tongue, kept set to the constantly decreasing diameter of the wheel.



Follow safe work methods

Don't force work against a wheel. Apply it gradually, particularly if the wheel is cold. This gives the wheel a chance to warm up and reduces the risk of breakage.

Never use a wheel beyond its capacity. It is futile and dangerous to attempt to grind a large piece of work on a small wheel.

Don't grind on the flat sides of wheels. A special wheel having a metal plate supporting one side is necessary. If an article, particularly if it is heavy, is ground on the side of a wheel the pressure may cause the wheel to break.

Don't use a wheel without a work rest, which should be adjusted as closely to the wheel as possible to prevent work from being trapped between it and the wheel. After each adjustment it should be securely clamped.

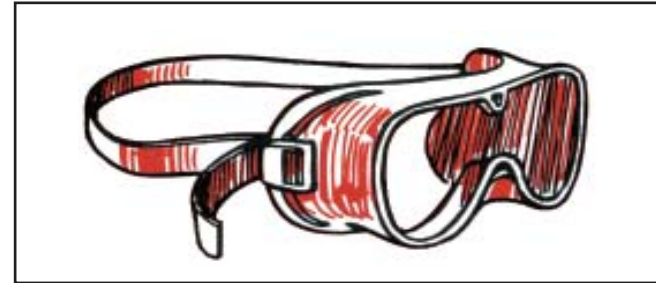
Never adjust a work rest while the wheel is in motion.

Don't use a wheel that is without a true and even surface. Have it dressed (see below).

Wear eye protection

Grinding is the cutting action of thousands of abrasive particles on the face of the grinding wheel. These grains actually cut chips out of the work. Therefore, one of the main hazards in the use of the grinding wheel is eye injury from flying particles.

Flying particles cause 60% of eye injuries at work, and it is particularly important that you wear eye protection when grinding. Alternatively, effective screens should be fitted to the machine.



Protect yourself against dust

Some grinding operations produce a lot of dust, and dust extraction equipment is necessary to prevent inhalation. If dust is only produced occasionally, it should be sufficient to wear a dust mask and keep the work space well ventilated.

Dressing worn wheels

This requires special equipment. Therefore, if a wheel wears unevenly or becomes out of balance through wear, send it to an establishment with the necessary equipment and experience to carry out the work.

Storing abrasive wheels

When you take delivery of a wheel inspect it for damage and give it a ring test. Despite the greatest care, there can be no guarantee that a wheel is flawless or free from damage.

The ring test

The wheel is suspended and struck lightly with a wooden implement, such as a hammer handle. The wheel should give a metallic ring. Remember that organically bonded wheels do not give as clear a ring as do vitrified and silicate wheels.

Grinding wheels need to be carefully stored. Straight and tapered wheels are usually best stored on edge in racks. Such racks should be cradle-like in construction to prevent wheels rolling. There should be partitions at suitable intervals to prevent the wheels tipping over.

If the wheels are large, store them on their sides with corrugated paper placed between them. Thin wheels should also be stored flat, on a true surface to prevent warping. When wheels are stored flat the rack holding them should be constructed so that the sides of the rack confine the wheels, and also so that too many cannot be stacked in the same pile. Small wheels should be placed in suitable boxes or drawers in a way that prevents them bumping against one another.

PORTABLE POWER-DRIVEN GRINDING WHEELS

Hand-held angle grinders are becoming increasingly popular — they are also among the most dangerous of power tools. Follow these basic rules for safety:

- Select the correct wheel for the job. Never grind on the side of a flat wheel; use a cup-shaped or saucer-shaped wheel for end grinding.
- Secure work so that it cannot move. the vibration of the tool means you will have a full-time job keeping it to the work.
- Always wear goggles when using the tool.
- Use both hands to hold the tool. The abrasive wheels are sometimes large in relation to size and weight of the total unit. Further, grinding causes

vibration. Fixed wheels absorb this vibration through the bench or other foundation; whereas with a portable tool you must absorb vibration through a firm grip.

- Turn off the power when not using the tool.
- Don't put the tool down until the wheel has stopped.
- When not using the machine put it where you won't trip over it.
- Store the tool carefully so that it is not struck or dropped. Grinding wheels are fragile.
- Make sure that you do not injure your fellow workers or others looking on. There have been many accidents where someone other than the user of the tool has been injured.
- See that the tool complies with the Electrical Wiring Regulations 1976.

LIGHTING

If abrasive wheels are located in a poorly lit area, there is a greater risk of the operator contacting the revolving wheel. Damaged work may also result. It is essential that there is adequate lighting around abrasive wheels.

REMEMBER

To protect yourself against injury you should purchase the correct wheel for the job, see that it is stored and cared for properly, and you should look it over before use.

FURTHER INFORMATION

If you have any doubt about the safety of abrasive wheels or other equipment or work methods you are using, then check back with the equipment supplier or manufacturer, or your local factory inspector.

The Department of Labour also publishes a range of other booklets on different aspects of workplace safety. Copies are available from your nearest district office