

# The **Hazards** of Wood-turning

This is an article about some of the dangers of woodturning . Some of them are specific to turning and some are associated with the other activities likely to be carried out in your workshop. The hazards that can cause ill health and injuries in industrial workplaces are just as much an issue for hobby turners. Perhaps more so, as the law provides some protection for people at work, including in the UK a requirement for adequate information, supervision and training to be provided to employees. Amateurs working alone may only discover the dangers the hard way (a good reason to go on a turning course).

But precautions can be taken, and most turners survive with nothing more than splinters and minor scratches from time to time. The risks are manageable if recognised, and there are gains to set against the risks. An absorbing occupation that helps keep you active has health benefits too. Turning is fun, and perhaps no more dangerous than other kinds of woodworking. And which activity hasn't got risks?

Some of the risks can be minimised by well-known safety rules such as keeping guards on machines and wearing face protection. Often, people ignore these rules and just work carefully. It's their choice. But it's hard to be careful all the time, and probably most people who get hurt thought they would be OK if they were careful. But there are some hazards that can't be eliminated and only taking care will protect you against them – for example you have to avoid getting your fingers caught between the spinning wood and the tool rest on the lathe, and similarly on the grinder. No guards can be fitted that will still allow you to do the work. Care, alertness and good working habits are always going to be necessary.

## **Dust**

People worry about breathing dust. All turners know that it's harmful, but often aren't sure how dangerous it is. Turners are exposed to dust concentrations significantly higher than the safety standards set for industrial workers. But few are exposed for eight hours a day, every day, the assumption behind those standards. Only a small proportion of hobby turners are likely to suffer serious harm.

Dust control is achieved in the turning workshop by effective collection at source, with a breathing mask if the extraction fails to capture all the dust. See below

## **Machinery and turning**

People can be badly injured or even killed by spinning wood. If spinning too fast, it can break up. The fragments will then fly in a straight line with all the kinetic energy given to them by the lathe motor. A key left in the chuck when the lathe is switched on will be flung out. An incorrectly presented tool can dig in, wrenching the wood as well as perhaps throwing the tool. If the timber is not held securely, it can come loose and hit someone, but while it remains in one piece, much of its kinetic energy is rotational. You don't want it hitting you, but if it does, the force of impact will usually be less than the hammer blow you could receive from half of a large bowl blank.

Sharp edges on the rotating timber can cut. The rotating drive centre or chuck, and the workpiece, can entangle hair or clothing, pulling you in with great and sudden force. Something will have to give, and that's a battle the lathe will win. Rags or steel wool wrapped round your fingers can also be dragged in. Projecting chuck jaws can trap your fingers against the tool rest or send a sharp cutting tool flying. The hollow Morse taper in the headstock will grab anything put into it, including a finger. Fingers can be dragged into the gap between the spinning wood and the metal tool rest. The lathe's drive belt could easily break your fingers against the pulley. A poorly presented cutting tool catching in the wood and snapping down onto the toolrest can pinch fingers.

A Jacobs chuck can work loose from the spindle taper and be flung across the shop.

Turners typically use other machinery, including bandsaw, chain saw, grinder, sander, drill, table saw and others. They may have rotating cutters and parts that can entangle hair or clothing, finger trapping points (for example between a grinding wheel and its tool rest).

Tie back long hair when using any machinery with exposed rotating parts. Don't wear long sleeves or loose clothing or jewellery that could get caught up. Don't take chances with poorly gripping chucks or weak fixing on a faceplate. Keep the lathe speed down when turning heavy pieces, particularly when they are not balanced – always check the speed before switching on. Don't use timber with dangerous cracks or bark inclusions or rotted areas. Keep out of the 'line of fire'. Make sure the off switch is within reach. Take off the sharp edge on a bowl rim with a tool or abrasive. Don't use a chuck with projecting jaws. Don't ever put your finger into the taper while the lathe is running. Move the toolrest out of the way when sanding. Use paper instead of rag when polishing, and don't wrap steel wool round your finger.

Never leave the chuck key in the chuck. Handle cutting tools with care around the spinning wood to avoid accidental contact, and don't have your finger between the tool and the toolrest. Don't turn large heavy pieces until you have plenty of experience of smaller ones – learn to walk before you run. Some lathes have steel mesh guards to stop flying chunks of wood. Wear good quality full face protection, properly adjusted – chips can fly up under a face shield and get in your eyes, unpleasant at the least. Don't use gloves if they could be caught and drawn in. (If flying chips hurt your hands, reduce the speed or put a chip deflector on the gouge. If your hands are cold, turn the heating up.) If using a Jacobs chuck without tailstock support, fit a draw bar to keep it secure.

Make sure you understand the machines, their hazards, and good practice in their use (for example the danger of kickback on a table saw is not immediately obvious to a beginner). Don't use the machines beyond their safe limits. Keep guards in place when the machines are in use, and use appropriate personal protective equipment. Full face protection is advisable at the lathe – safety glasses are not sufficient.

Bandsawing timber for woodturning has some particular hazards. For example, cross-cutting round timber can cause the blade to grab and bind. This can jerk your hands into the blade or crush your fingers between the wood and the saw table. It is best to hold the timber with a clamp to stop it rolling into the blade. Any blank without support under the point of the cut can tilt into the blade. Sawing spalted wood can sometimes be a problem. You may be pushing the wood into the saw when the blade enters a soft patch and the wood suddenly shoots forward. You should never push with your hand in line with the blade. When cutting discs, you may also find the wood shoots forward suddenly when the blade comes out of cut after sawing off the corner of the blank.

## **Electricity**

Fatal electrocutions are rare, causing only a small percentage of industrial deaths. But electric shocks that fail to kill are much more common. Whether a shock is fatal often comes down to luck – it depends on whether there is a low resistance path for the current to earth at the moment when you are shocked. If, for example, you are standing on a wet concrete floor or have your hand on a machine that is earthed, more current will pass through your body, and it may kill you.

Ensure that all wiring and appliances are in sound condition. Check flexes and plugs from time to time. Use an earth leakage device that will disconnect the power in the event of a shock. Don't use unsuitable electrical equipment in damp conditions. Don't use makeshift, substandard wiring or 'temporary' unsafe fittings.

### **Falls**

Slips and trips are the commonest causes of injury in the workplace.

Keep the floor clear of obstructions and anything slippery, and keep the working area well lit. Don't

climb on makeshift steps or unstable platforms from which you could fall. Repair any holes in the floor. Don't let cables and hoses trail across the floor. Clear up off-cuts. A floor can become slippery as the surface wears, or if oil finish, wax polish (or wax sealer from turning blanks, a particular problem) or sawdust gets on it, so may need attention. Don't forget the route to the workshop. If you have to go down a dark garden path with icy patches and steps, it's only a matter of time before gravity gets you.

### **Heavy objects**

Chucks and bowl blanks, and sharp tools can easily cause serious foot injuries if dropped. Keep working areas tidy so that chucks etc. are less likely to fall or be dropped. Have a good place to keep tools when they are waiting for use – don't just perch the skew chisel on the vibrating lathe bed. Wear shoes with steel toecaps.

### **Manual handling.**

Back strains caused by lifting are extremely common. Moving logs or machinery can injure you. The risk does not just depend on the weight of the object; other factors come into play, for example, if workshop clutter forces you to move awkwardly when you pick up a large bowl blank. Use a trolley to avoid unnecessary lifting. Break the load down if possible. If lifting has to be done, plan it. Clear the working area so you don't trip. Get help.

### **Fire**

There are several ways in which a fire can start in the workshop. Steel wool very easily ignites from sparks. Oily rags can catch fire spontaneously. Shavings caught up above the bulb of a work lamp can get hot enough to start smouldering, allowing embers to fall into shavings beneath. Cigarettes can fall into shavings. Fire is always dangerous, and the shop could be destroyed, perhaps after you have locked up for the day.

Don't leave steel wool near sparks from the grinder, or in a drawer with batteries (contact with their terminals will ignite it). Spread out oily rags to dry before disposal. Use lamps with open shades that won't trap shavings. Keep an extinguisher where you can find it straight away. You know what you should do about smoking – it's a lot more dangerous than woodturning.

Oh, and don't superglue yourself to the lathe when there is no-one about to rescue you!

## **Wood Dust**

The facts about wood dust are sometimes misunderstood. This is what you should know.

All airborne wood dust is hazardous. That includes hardwood dust, softwood dust and MDF dust. MDF dust is not worse than the others, though it is a material that easily makes a lot of dust, and more dust can mean more risk. All are known to be capable of causing serious harm such as dermatitis, breathing problems and even cancer. It is not a question of the wood's toxicity or your individual sensitivity. Some timber species may be more dangerous than others, but if so, it is hard to say which ones. The proof of harm comes from the mortality of long term workers in the furniture industry, with timbers such as beech.

A hazard is something with potential to cause harm. That doesn't necessarily mean that harm will result. That depends on the degree of exposure to it and what precautions are taken. The likelihood that harm will actually result is the 'risk'. As a woodworker, you are exposed to the dust hazard. To protect yourself, you have to control the risk.

The risk depends on how much dust is present and how long you spend breathing it in. So an occasional turner working green (less dusty) wood is at less risk than the dedicated individual who spends long hours hunched over the lathe hand-sanding dry and dusty stuff. Only a small proportion of those exposed to wood dust are likely to get cancer as a result, but turners can easily expose themselves to very high dust levels, well above the legal limit for commercial workshops. There is

no absolutely safe dust level, but if you keep within the legal standards for commercial workplaces the risk is low.

There may be species of wood that you as an individual are allergic to. You may develop dermatitis or breathing problems even after minimal exposure to them. But other species to which you are not now sensitive are hazardous to you as well, just as they are to other people. And you may develop an allergy to another species at any time, even after years of working with it.

Lots of things in the turner's workshop generate dust. Turning, sanding, sawing and sweeping all make clouds of dust, that cannot be clearly seen in ordinary lighting. The fine particles that are most hazardous are almost invisible in the air, and remain airborne for a long time.

In a commercial workshop in the UK, the COSHH regulations require that the risk is reduced to a level that is unlikely to result in harm. This can be done by using work methods that do not generate dust, by removing the dust at source before anyone is exposed, or by using personal protective equipment such as overalls and breathing masks. In commercial workshops where the law applies, that is the order of choice required. This is a sensible rule in other places too, because masks are never fully effective and it is much better to keep the dust out of the air in the first

## **Dust control**

If you are a woodturner, you work in an environment where hazardous levels of dust are in the air you breathe. Turning generates dust, and breathing dust is harmful to your health. It can cause breathing problems or cancer. Dust on the skin can lead to dermatitis. All types of wood dust are hazardous, including softwood dust.

The best way to avoid exposure would be to work in such a way that dust is not produced. Keeping tools sharp, using the less dusty timber species, and wet sanding with water or oil will help reduce dust levels. But most turners are exposed to dust and need a way to protect themselves. There are several options for dust control.

### **Breathing masks**

The simplest precaution is a breathing mask. It is the easiest, and at its most basic is the least expensive option. A mask can be effective for low levels of exposure. It may be appropriate for people who do not turn frequently or for long periods of time, where the cost of dust extraction is not justified. But it is not the best primary protection for most turners. There are several reasons for this.

Although a well-fitting mask can protect the wearer, it can only do so while it is being worn.

Hazardous dust is so fine that it remains suspended in the air for a long time after work stops. A mask must seal to your face to prevent unfiltered air being drawn under the edge, so may be uncomfortable to wear. It may not seal properly, and if you take it off when the job is done, you will then be breathing air that is still dusty.

The best kind of mask is a powered unit that filters the air before blowing it over your face. These can be comfortable, or at least acceptable for hours of use, as the positive fan pressure means that the mask doesn't have to seal to your face. In addition, the visor may be impact resistant. If you wear spectacles the air flow will help stop them fogging.

A mask will not prevent dust from contacting your skin.

### **Air cleaners**

These filter the workshop air to remove background dust, but have failings. Most importantly, you work closer to the dust source than the air cleaner does, so the air you breathe carries the heaviest load of dust. A cleaner takes a significant time to remove all the suspended dust in the shop. It is not just a question of comparing its rated air flow with the volume of the workspace. The filtered air mixes with the unfiltered, diluting the dust concentration, which is reduced slowly. Meanwhile anyone in the workshop is breathing it in.

An air cleaner should be positioned so that it will set up a circulation of filtered air around the shop, but there are always likely to be dead spots where dust removal is slower.

## **Fans**

Some people suggest a fan to blow the dust away from the turner. In the right conditions this could work. It will reduce the highest concentration in the inhaled air even if the dust remains in the workshop. If there is enough general ventilation in the shop, the concentration may not build up to harmful levels. But it is not normally a reliable method. The ventilation and the direction of air flow from the fan may vary, dust may escape into the workshop atmosphere, and harmful levels may be reached without you knowing.

## **Dust extractors.**

A dust extractor is intended to be positioned so it catches the dust where it is generated and before it gets into the general air circulation of the workshop. This is in principle the best solution, and is the reason why workplace health legislation favours extraction over the other options.

But not all extractors are suitable. The lathe is a difficult machine to extract dust from. The dust source may be anywhere along the lathe bed or across a spinning disc, and the particles are thrown in all directions, including towards you and away from the extraction inlet. Meanwhile, you are bending over the work and breathing in the highest concentration of dust.

The suction has to overcome the speed of the air movement generated by the spinning work. Dust from the tool or from sanding will be entrained in this moving air, which may be quite rapid. You can feel the wind coming off the edge of a spinning disc. This means that a powerful extractor is needed.

Unfortunately, the suction from any extractor falls off very rapidly with distance from the inlet. At a distance equal to the diameter of the inlet, the air speed may be only 10% of what it is in the mouth of the inlet. This is because the air is drawn into the inlet from all directions, including from behind it.

Therefore, to capture the dust the inlet diameter needs to be large, so the dust source can be within its effective zone; it must be adjustable so it can be positioned close to the dust source; and the extractor must be powerful enough to provide good air flow through the large inlet. Although any extractor may be better than none, it's not enough just to use a large collecting hood if the extractor is too small for it.

It is important that the extractor has a fine filter, otherwise much of the dust will be returned to the workshop. With a fine filter, an extractor will act as an air cleaner if it is left running.

There are two kinds of extractor – high volume low vacuum; and low volume high vacuum, which are similar to domestic vacuum cleaners. Lathes need a high volume air flow to capture the dust, rather than high vacuum. There is an overlap between these types of machine, and some powerful high vacuum machines may be able to move more air than a small and inefficient low vacuum one. It is important to check the cubic feet per minute specification and not be fooled by the high suction that you feel when you put your hand over the inlet. The vacuum will pull hard when the inlet is blocked, but comparatively little air may be moving through the pipe when it is open.

High vacuum machines are very good when the dust source is enclosed and the pipe can be connected to the source. But if they are used to extract from a lathe, the inlet must be positioned very close to the source, and moved as the source moves, which is not always practicable.

Whatever kind of extractor is used, it will often fail to get all the dust. A dust mask can then be used to supplement the extractor. Many people routinely use both.

## **Other Dust Sources**

Sanding on and off the lathe produces a lot of dust. Using a machine will produce a lot of dust very quickly. Some sanders have dust extraction port and if you can connect it to an extraction system, do so. If you cannot, then use your respirator, why not use one anyway as the temptation is always to take it off when you have finished sanding.

Using a grinder for sharpening, produces very nasty particles, and if you true up your stone before use, you don't want to breathe that in either. Use your respirator!

If you sand on the lathe get your extractor working and use your respirator.

You can however reduce the amount of dust you produce by **Wet Sanding**.

You can use any liquid in theory .Try using different oils,it has additional advantages,a smoother finish and the sludge helps fill the pores in open grained timber. However it is messy so cover things up first.

Hopefully you still want to turn after reading this article.

**Keep a phone handy to summon help if needed.**

**Use your common sense.**

**Dont make important decisions or use machinery when you are tired.**

**The piece will still be there tomorrow.**