

SAFETY

**High-speed rotary cutters are dangerous. They can cut brass.
Your fingers would mince easily.**

If you're building any sort of tooling rig, you've got to look at what you're doing and decide what safety precautions are needed to keep **you** safe. If you're clumsy and accident-prone, use plenty of safety screens, or maybe you should find a safer hobby.

The main dangers are obvious:

A cutter could break or fly off.

A cutter could throw a bit of work.

Your hands could touch the cutter.

If you're using an overhead drive, you could get tangled.

If you haven't tightened a bolt when assembling the equipment, things could get nasty, particularly if it's the cutter that's loose.

Dust from some exotic timbers can cause lung problems and allergic reactions.

EYE PROTECTION IS ESSENTIAL

A face shield is a good idea, particularly for a beginner.

When you have more experience, you can decide if you want to take the chance of an unexpected piercing. Plastic screens between you and the cutter improve safety, but can get in the way.

If you're using thin carbide cutters, they're much more likely to break than thick cobalt steel, but lightweight cutters are much easier to stop than big heavy ones.

Flying cutters tend to stay close to the plane of rotation. Don't look at them from that angle.

Never put a cutter into its holder without tightening the securing screw.

If you're clumsy when applying the cutter to the work, you'll face more flying bits.

You have to keep your hands away from the cutter. It's curious that the biggest danger comes when everything's going well. You notice a shaving stuck to the surface of the work. You just want to knock it out of the way, to see if there's a mark on the work. The rotating cutter is nearly silent and invisible, **ready to chop the end off your finger.**

I suspect most Ornamental Turners have found themselves in this position. Just see how many of us keep a small brush at hand to clean shavings from the work. When you're starting, a safety shield between your hands and the cutter may help remind you of the danger. Only switching the cutter on when you want to cut, can help. Eventually it should be a trained automatic reaction to keep fingers away from the cutter. Always using the little brush to clean the surface helps reinforce the lesson. I feel that if you rely on safety screens, you'll be in danger when you're in a hurry and don't rig the screens properly, and screens do get in the way. There's always the danger you'll move them and forget to rerig them safely.

If you're rotating the work by hand, you've got to be sure that if the cutter grabs the work, your hands won't be drawn into the mess. I like to hold the dividing plate or the back of the chuck. A solid chunk of metal between hands and cutter is reassuring. When you're starting, a plastic ring around the chuck may help remind you of the dangers, as well as protecting your hands from flying bits. Whenever the cutter seems a bit close to your hands, try to get a safety shield in between.

If you want to avoid any danger to your hands, rotate the work by holding the rosette, or a large handwheel at the back of the mandrel. A low-speed hand drive, or a geared motor drive, allows you to keep your hands well out of the way. A traditional Rose Turner will have one hand turning the

handle on the low-speed drive, and their other hand controlling the sliderest.

I've mentioned the cutter throwing the work. It doesn't happen very often. Curiously, radial flycutters are safest, possibly because of their small size (most of my cutters are 1/8" diameter- bigger cutters are more dangerous). They're most likely to throw work out of a chuck when you cut around the end of a cylinder- take very light cuts till the shape's well established. An eccentric cutter is more likely to grab the work, but there's generally not enough force to throw it far. Milling cutters are much more likely to grab hard, and large router bits are the most dangerous. I rarely use them.

You have to think about the direction you rotate the work. If you push against the rotation of the cutter, it's much safer, but going with the rotation can give a better finish if you can retain control of the situation. The effective force the cutter can put into the wood depends on the diameter of the work. It's surprising how forceful a 6mm milling cutter can be, when it grabs the edge of a 6 inch platter and tries to get you to play Frisbee. I'm very cautious when doing larger work, and feel a big heavy headstock is safest for over 6 inch diameter.

It's easy to see if I'm worried about a new technique. Face mask and gloves are the first step (I always wear safety glasses). If I'm using safety screens at home it means I really don't know what might happen. Within half an hour, either I'll feel comfortable with what I'm doing, or I'll find a safer approach. If you're attempting an unfamiliar technique, overdo the safety precautions until you're absolutely sure you know what you're doing. It's all too easy to misunderstand a small but critical detail, however careful you are in reading the instructions.

An overhead drive presents real dangers, although the drive cord's thin and not over-tight, so you could stop it with your fingers. There's a lovely story told by one of J.H.Evans' pupils, who arrived for a lesson, to discover the master with his beard seriously entangled in a universal cutting frame.

We still remember the tale over 100 years later, so perhaps it wasn't a common occurrence, but if it could happen to an expert like JHE, we all need to look out .

If you want a close look at the work, stop the cutter.

If you're working with improvised equipment, there's always the danger that one of the clamps or bolts holding things together will work loose. The first clue that something's wrong is often subtle, perhaps just a change in the sound of the cutter, or an unexpected change of cutting depth. Don't ignore the problem. It's usually the bolt you don't bother to check. You have to think, if the work came loose and was drawn into the cutter, what would happen to your hand? In this situation, thin, fragile cutters are an advantage. They break easily, and with this type of breakage, the cutter normally falls harmlessly, it's energy absorbed by the collision with the work. Stronger cutters might be much scarier.

Dust will always be a problem for most of us. In theory, if you have a perfect finish on the edge of your cutters, you'll only see fine shavings, but I'm told they fill the air like a snowstorm, so extraction is still needed. Dust is best extracted from as close to the source as possible. All fine wood dust damages your lungs, but some of the dense exotic timbers we use can be particularly irritating. Pink Ivory has the reputation of being the most dangerous. If you already suffer from allergies, you may be safest avoiding most of the exotics, although I've never come across anyone who's allergic to African Blackwood or Lignum Vitae. If you grind your own cutters, remember that fine carbide dust from a diamond grinding wheel is extremely harmful Fortunately it's heavy and doesn't fly around, but don't take any chances. Try to avoid breathing any fine dust. I find a filtered-air face mask, and a dust extractor near to the cutter, very effective.

I feel that if you're setting up a machine to demonstrate to the public, it should be screened so viewers can only see the cutter through the screen, particularly if you're using thin carbide cutters. This is most important near the plane of rotation of the cutter. For absolute safety, you'd put the

machine behind a plastic wall, but this makes communication with the public impossible, and that's the whole point of being there. It generally helps if you can keep people far enough back to be unable to peer around the screens. Effective screening for a cutter in vcf mode is most difficult so I don't demonstrate basketwork. I find Perspex best for screens, it survives transport without scratching too badly. If it's self-supporting, it's thick enough. Polycarbonate is stronger, but it isn't necessary for the energy levels in small fly cutters, and it marks much easier. It is useful if you're making a small screen to fit near the cutter. You can shape it in the same ways as you'd bend sheet metal.

When you see an Ornamental Turner at his lathe, you won't see any obvious safety measures. The sight of an elderly gent poking a wavering finger at a bearing to see if it's hot, apparently unaware of the whirling cutter less than an inch away, can be quite unnerving. I've looked around at large gatherings of OTs, and a full set of digits seems the norm, so I guess they actually know what they're doing. Traditional equipment, carefully used, is pretty safe. Ornamental Turning was a popular hobby for gentlemen throughout the 19th century. I've not come across any stories of lost fingers or eyes, even though I'm sure a lot of Victorian gentlemen weren't particularly practical or competent with machines. Many plain turning techniques are potentially more dangerous. So long as you're aware of the dangers, and take appropriate precautions, it's a safe hobby.

You're the only one who can decide what safety measures you need to stay safe. If you wanted absolute safety in a factory setting, you'd have to devise a machine in a plastic box, with all the controls safely on the outside. I don't think that's appropriate for a home workshop, but you must make your own judgement. I'm happy that my working methods are safe for me, but they may not be right for you. Think what you're doing. Overdo the safety precautions till you understand what you're doing.

If there's a plastic screen between you and the cutter, you shouldn't come to any harm.