

How to Prevent

Use a riving knife, avoid a few pitfalls, and work with no worries

BY ROLAND JOHNSON

Most severe table-saw injuries are caused by kickback. The main solution for it is using a splitter behind the blade. And the best type of splitter is a riving knife. There's more to the story, but those are the headlines.

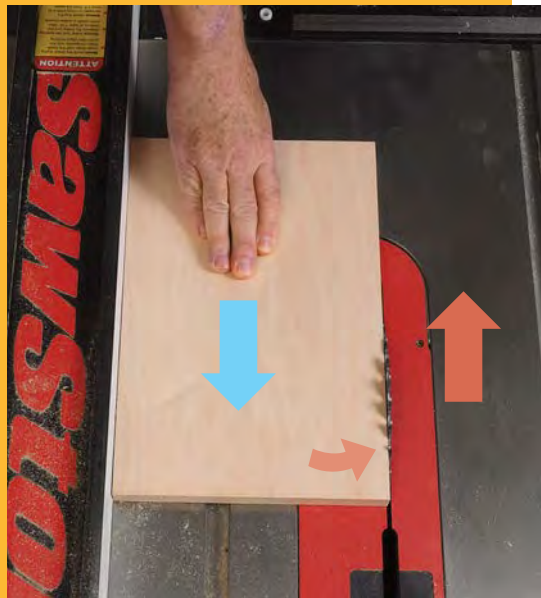
Let's start by defining what kickback is and why it's so dangerous. When you cut a board on the table saw, the teeth at the front of the blade are supposed to do all of the cutting. Those are spinning down toward the table, so they push the board in the same direction, with the table acting as the control surface. Kickback occurs when wood encounters the teeth at the back of blade, which are spinning upward, propelling the board toward the user.

There are multiple ways kickback can be triggered, but the motion and the danger are the same. If the rear teeth grab the wood firmly enough, they can lift the wood off the table, propelling it toward the operator with significant force.

The process happens so suddenly that the user lacks the time needed to release their grip, which means that their hand can be

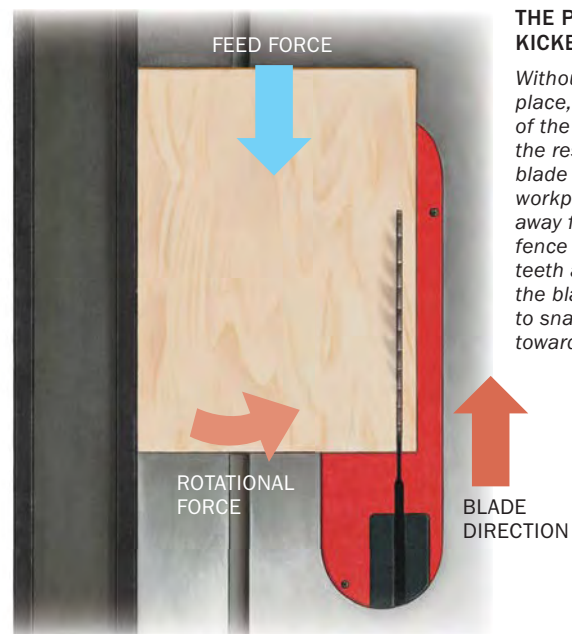
INJURY IN THE BLINK OF AN EYE

Not only can table-saw kickback send a workpiece back toward the user at over 100 mph; it can also drag the user's hand into the blade.



WHAT IS KICKBACK?

The most common cause of kickback is the workpiece wandering away from the rip fence and contacting the back of the blade, which is spinning toward the user. The piece then jams between the blade and the fence, causing it to pick up speed as it rotates back toward the user. All of this happens in milliseconds.



THE PHYSICS OF KICKBACK

Without a splitter in place, the opposition of the feed force and the resistance of the blade can cause the workpiece to pivot away from the rip fence and contact the teeth at the rear of the blade, causing it to snap back violently toward the user.

Table-Saw Kickback

drawn into the blade. The projectile can also strike the user with catastrophic force.

SawStop technology is a secondary measure

You've likely heard lots about SawStop's revolutionary table-saw safety technology, which senses blade-to-skin contact and then stops and drops the blade just a few milliseconds later. This happens so fast that the worst possible accident is a scratch—fixable with an adhesive bandage. Although this exciting technology deserves all of the headlines and sales it has generated, it's not

the most important safety feature on a modern table saw. That distinction goes to the riving knife, a relatively new form of blade splitter. (Keep reading to learn about the differences between a traditional splitter and a riving knife.)

Early in SawStop's history I had a chat with its inventor, Stephen Gass, who had discovered two important things in his research. First, 60 percent of hand injuries are precipitated by kickback. Second, a riving knife virtually eliminates kickback.

While kickback is the main reason for hand-to-blade accidents, it's not the only one. Fingers can stray into the blade during a

AN EFFECTIVE SOLUTION

A properly aligned splitter or riving knife, positioned at the back of the blade, sits in the kerf, preventing the workpiece from rotating and coming into contact with the teeth.



Change-out is quick and easy. When you need to remove your riving knife—when making dado cuts, for example—it comes out easily and goes back into place just as quickly.



The knife sits just below the top of the teeth. All riving knives have a low-profile version (or a low-profile position) that keeps their tip just below the top of the blade, so they can stay in place for non-through cuts and when using a crosscut sled.



It tilts with the blade too. Riving knives tilt sideways with the blade, so they can stay in place for bevel cuts as well.



Setting up your riving knife



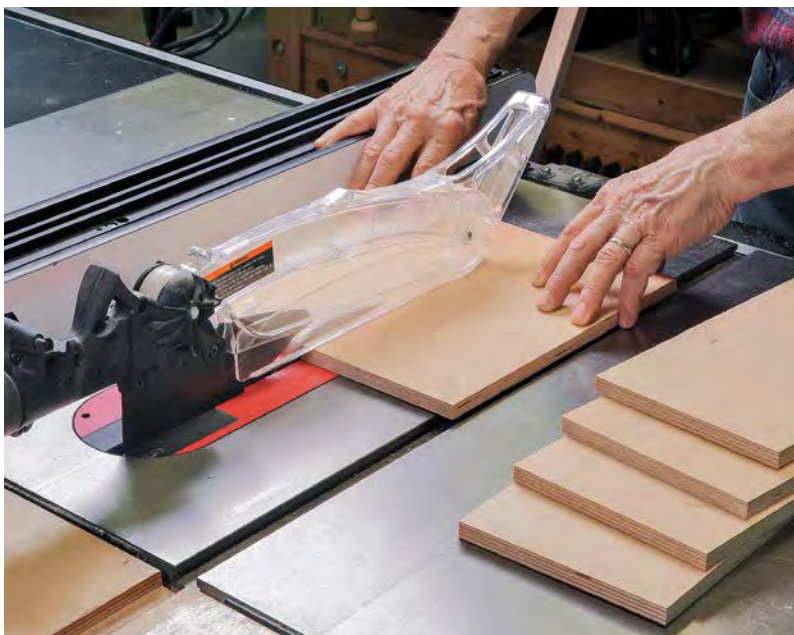
Be sure your knife matches your blade. Most riving knives are thin enough to work with thin-kerf blades. But some are designed for standard-thickness blades and will jam in thinner kerfs. Thinner knives are often available.



Check the alignment. To make sure your knife is aligned properly, hold two straightedges alongside the blade (avoiding the teeth), and extend them past the knife. There should be tiny gaps on both sides of the knife.



Make adjustments. Read your saw's manual to find out how to realign the riving knife. It's easy in most cases.



The good and bad of blade covers. Modern saws offer a low-profile riving knife, as well as a taller one combined with a blade cover. Blade covers can prevent hand-to-blade contact, and they also shield the user from flying dust, collecting it in the process. That said, the high-profile knife won't allow cuts that don't pass all the way through the workpiece, and the blade cover can block sight lines and push sticks. It must also be removed when using a crosscut sled.



moment of inattention. You might push a board without noticing where your hand is exactly, or forget where the blade will emerge from the back of a table-saw sled, and so on. For those types of situations, as well as kickback, SawStop technology is an undeniable blessing.

The trouble with traditional splitters

Riving knives are relative newcomers to the U.S. table-saw market, required by a 2012 law that covered all new saws manufactured after that point. Before 2012 we had a less effective type of splitter, which was so inconvenient that most users removed theirs permanently. And with no splitter sitting in the kerf, kickback was rampant, giving woodworking a well-earned reputation for scary injuries and missing fingers.

When you hear about terrible table-saw accidents, you are very likely hearing about a saw that was used without a splitter. But it's hard to blame woodworkers for discarding those old, inconvenient splitters.

First, traditional splitters stood tall behind the blade, so they only worked on cuts that went all the way through the board. If you were cutting a slot in the bottom of a workpiece, it would stop dead when it hit the splitter. Even worse, old-school splitters were tedious to remove and replace. So off they came, coming to rest in a dark corner of the shop, never to be seen again.

Enter the riving knife

Long mandated in Europe, which tends to have stricter worker-safety laws than the United States, a riving knife is a vastly improved type of splitter, one that is far more likely to stay on the saw and more likely to prevent kickback. Attached to the saw's trunnions, a riving knife moves up and down as the blade height is adjusted. This keeps it at the same distance from the back of the blade throughout

Adding a splitter to an older saw

If you have an older saw that lacks a modern riving knife, here are a couple of ways to add a low-profile splitter. These won't tilt or move up and down with the blade, but they can stay on the saw for the most common cuts. You'll need to make your own throat plate, from solid wood or plywood, in order to make these splitters work.



Store-bought solution. Microjig's MJ Splitters come with drilling templates for the holes that hold them in place, aligned with the blade. The splitters are sized to sit below the top of the blade for most cuts.



Make your own. Clamp a board over the top of a fresh throat plate, and bring the blade all the way up through it (far left). Then turn off the saw, drop the blade, and glue a small tab of wood in the back of the blade slot. When the glue cures, bring the blade back up to working height (left).

its vertical travel; that tight gap is very helpful for preventing kickback.

Riving knives are available in two configurations. The most useful version looks like a shark fin. It can't hold a blade cover, but it offers a critical benefit in return. This low-profile version sits just lower than the top of the blade, and it maintains that relationship as the blade is raised and lowered. It also tilts with the blade for bevel cuts. This means it can stay in place for slotting cuts and almost every other type of cut. The main exception is cuts made with a stack of dado blades. When you do need to remove the riving knife, it goes off and on in seconds. So you really have no excuse not to use it.

Remember that kickback is the primary cause of table-saw accidents, but a properly used riving knife will prevent it. Do that and you can relax at the table saw, leaving you free to focus on keeping your hands safe and clear of the blade. □

Roland Johnson is a contributing editor.



Smooth sailing. You can have different throat-plate/splitter setups for different blade heights, including a tall splitter for through-cuts (pictured) and a shorter one for slotting cuts.

Other safety problems are just as easy to solve

Staying out of harm's way requires more than riving knives and flesh-sensing technology. The most important practice is to stay in the moment. While you're working with a spinning blade, don't let your mind drift to the glue-up that's coming next. It's critical to stay focused on where your hands are and what's happening with the wood. Similarly, don't use any power tools when you are tired or distracted. It's also essential that the blade be parallel to the miter slots and rip fence, and for the riving knife to be properly aligned. If you've checked those boxes, you're ready to read on.



MILL BOARDS BEFORE RIPPING THEM

Most kickback occurrences can be traced back to problems that were present before the wood hit the blade. One typical mistake is trying to rip warped or otherwise rough lumber that hasn't yet been milled flat and straight. You need to mill at least one face and one edge flat (left) before ripping the board. Those surfaces go against the saw table and rip fence, ensuring that the board moves in a straight line through the blade. Rip a crooked or warped board on the table saw, and it will rock and twist as you push it, potentially pivoting onto the back of the blade.

DON'T RIP WIDE BOARDS DOWN THE MIDDLE

Another common mistake is using the table saw to rip wide boards down the middle. The drying process often creates internal stresses in boards. When those boards are ripped down the middle, such stresses can cause the two halves to pinch together behind the blade. On the table saw, this can cause kickback. On the bandsaw, however, with its narrow blade, the pinching is not a problem. This is why wide boards should be ripped to rough size on the bandsaw before being taken to the table saw and brought down to final size. If the boards pinch, twist, or warp significantly on the bandsaw, that's a sign they might be better suited for kindling than woodworking. Extremely stressed wood is called "reaction wood," and the telltale signs are grain runout, grain switchback, loose knots, cracks, and splits. If you see those signs, proceed with caution. Loose knots can also turn into projectiles on the table saw. Usually I cut them away during the milling process, but if I want them in my design, I secure them with CA glue or slightly thinned hide glue before milling the wood.



USE THE RIGHT PUSH STICKS

When ripping, always control the piece trapped between the blade and the fence. If the rip cut is 6 in. or wider, I use my hands to push the piece through. On anything narrower, I use a push stick to make sure my hands stay well clear of the blade. The right type of push stick has a long section that rides on top of the board, helping you press it down and steer it, and a hook at the back for pushing. The plastic push sticks included with most table saws don't make the grade. These have a small bird's-mouth at the end of a long handle, which only serves to push the board, not hold it down or steer it. Move that stick over to your bandsaw, where it will work just fine.



DON'T USE THE RIP FENCE FOR CROSSCUTTING

If you run the shorter edge of a workpiece against the rip fence to avoid using a miter gauge or crosscut sled, you are risking an accident. That's because it's hard to keep the short edge against the fence with so much of the workpiece dragging on the table. The short edge will want to pivot away from the rip fence, which can cause the workpiece to jam against the back of the blade and kick back. There are safer options for big crosscuts like these. One is to shorten the workpiece first with a rough cut made with another tool, like a track saw, for example, making it safer to run against the rip fence for the final cut. The other is to support the long workpiece using a crosscut sled (or a miter gauge, depending on the width of the piece).



THE RIP FENCE IS NOT A CROSSCUT STOP

When crosscutting boards with a sled or miter gauge, don't use the rip fence as a work stop (above left). The drag of the fence will want to pivot the board, causing it to jam between the blade and fence, potentially turning it into a projectile—heading right at you. A safer solution is to clamp a spacer block to the rip fence well ahead of the blade (above right). Bump the workpiece against it, and push the piece forward into the blade. It will be well past the block when the cut is made, with the necessary clearance to avoid jamming (right). Even better, when possible, is to clamp a stop to the miter-gauge fence or crosscut sled itself and move the rip fence out of the way altogether.

