Kicking Kickback

Startling at the least, injury-causing at worst, kickback can happen on a variety of tools when a fast-spinning cutter grabs the workpiece and throws it back at the operator. Understanding why it happens is the first step in preventing damage to your tools, project parts, and body parts. Then by tuning and using your tools properly, you can prevent it.

In this article, we'll look at four tools prone to kickback: tablesaw, router, mitersaw, and jointer. Regardless of the tool, always keep blades and bits sharp and clean to reduce friction. That keeps the cutter moving easily through the wood instead of grabbing at it, and contributing to kickback.

Tame the tablesaw

When mentioning kickback, woodworkers often think of the tablesaw first because it can turn small or large workpieces into powerful projectiles.

How it happens: At the rear of the blade, the spinning teeth trace an upward arc as they emerge from below the table. A warped board, a misaligned rip fence, operator error, or internal stresses in a workpiece can push the workpiece into the path of these teeth. This action lifts and pulls the workpiece further into the teeth, accelerating the workpiece up and back toward the operator.

How to prevent it: Use a riving knife or splitter to prevent boards from contacting the teeth at the rear of the blade [**Photo A**]. With crosscuts, the riving knife or splitter prevents both the cutoff and the keeper from wandering into the blade's rear teeth. During a ripcut, these devices keep the kerf open as the board passes the rear of the blade.

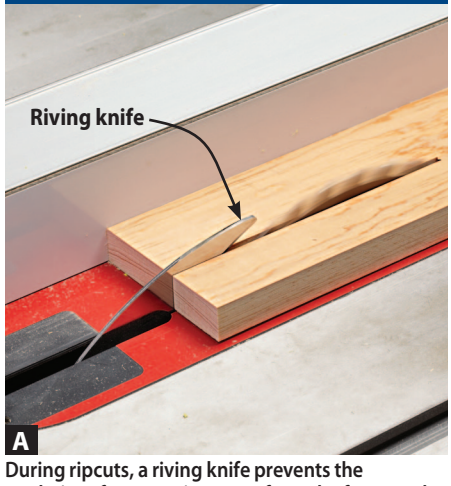
The blade you choose can also make a difference. See **Give kickback the cold shoulder** at *right* for details.

If you hear a telltale "zing" at the completion of a cut, that indicates a misaligned blade. Adjust both the blade and the rip fence parallel to the miter-gauge slot. (Refer to your owner's manual and **More Resources** on *page 50* for help with this process.) With these three parallel, boards won't pinch between the fence and blade during ripcuts, and when crosscutting, the material contacts teeth only at the front of the blade.

Even with a well-tuned saw, much still rests on your technique. During ripcuts, use featherboards or hold-downs whenever possible to press pieces against the fence and table just ahead of the blade. Choose a pushblock that provides stable downward pressure while gripping the workpiece firmly to provide the greatest control [**Photo B**].

When crosscutting, never use the rip fence as a stop; the offcut, trapped between the blade and fence, *will* be thrown back at you. Instead, make an L-shaped standoff block and clamp it to the rip fence in front of the blade [**Photo C**]. This allows you to cut multiple pieces to the same length and creates space so the cutoffs stay safely away from the back of the blade.

COVER YOUR BLADE'S BACKSIDE



During ripcuts, a riving knife prevents the workpiece from moving away from the fence and contacting the rising teeth that cause kickback.

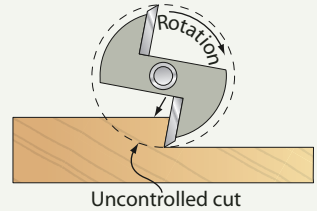
Give kickback the cold shoulder

Some saw blades and router bits have a built-in shoulder in front of each cutting edge to reduce kickback. The shoulder limits the depth of the cut, as shown in the photo and drawings *below*.

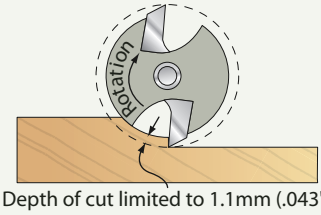
On tablesaw blades with more than 50 teeth, the close spacing of the teeth precludes the need for shoulders.

The shoulder behind each tooth on this 24-tooth rip blade limits how deeply the next tooth will cut.

STANDARD BIT



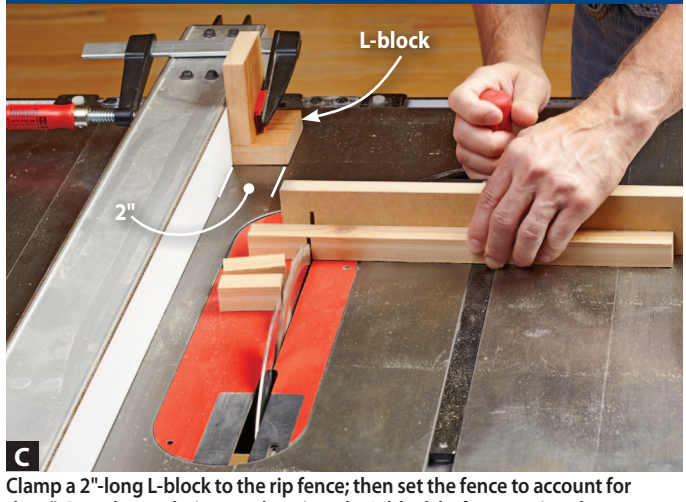
ANTIKICKBACK BIT



MAKE A PUSHBLOCK FROM SCRAP

A long notch in one edge of a scrap creates a hook that helps you push the workpiece down, forward, and against the fence.

GIVE ME WIDE OPEN SPACES



Clamp a 2"-long L-block to the rip fence; then set the fence to account for the 2". Butt the workpiece end against the L-block before starting the cut.

Don't wrestle your router

Ever feel like you've gone three rounds with your handheld or table-mounted router? That unruly behavior results primarily from poor operator technique—and that's an easy fix.

How it happens with a handheld router: Trying to remove too much material bogs down the router, slowing the bit. With reduced momentum, the cutter hammers rather than slices the wood, and kicks the router away from the material. The same thing can occur when the bit encounters a knot or a foreign object, such as a screw or nail.

How to prevent it: As shown on the *previous page*, antikickback bits greatly reduce the problem by controlling the amount of bite the bit can take. To further reduce kickback, run bits at the fastest safe speed (**Router-Bit Speed Chart**, *below*) that provides good results on your workpiece. Also, rout large profiles or deep cuts in several passes, increasing the bit's exposure by ⅛" with each pass.

How it happens on the router table: Starting a freehand cut with a bearing-guided bit [**Photo D**] is a surefire recipe for kickback. As the cutters bite into the wood, the bearing doesn't yet contact the edge. Because the workpiece lacks any support, the bit can dig in deeper than intended and kick the workpiece back. The greater the area of the exposed cutters, the greater the potential force of the kickback.

How to prevent it: Install a starter pin [**Photo E**] or, if your table insert doesn't accept one, clamp a narrow scrap about 2" from the bit. Rest the workpiece against the starter pin or the end of the scrap and slowly pivot the board into the spinning bit, so the depth of the cut increases gradually and controllably. After the workpiece contacts the bearing, you can pivot the piece away from the starter pin and continue routing.

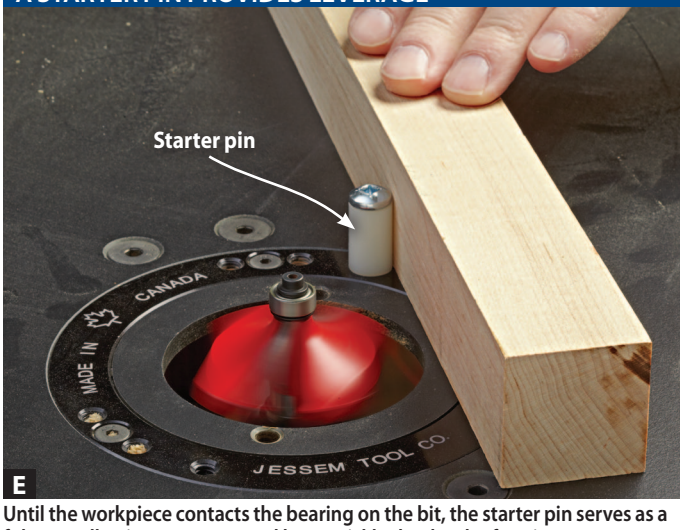
As with a handheld router, foreign objects, knots, or spots where the grain changes direction can also cause kickback. In addition to using antikickback bits at their fastest safe speed, and routing deep cuts in several passes, mount featherboards as hold-ins and hold-downs [**Photo F**]. These minimize the chances and effects of kickback, giving you more control and a better routed surface on the workpiece.

DON'T DO THIS! FINGERS AND WORKPIECE IN DANGER

D

With no way to control the workpiece or cutting depth once the wood contacts the cutters, the rotation of the bit will jerk the workpiece violently.

A STARTER PIN PROVIDES LEVERAGE



E

Until the workpiece contacts the bearing on the bit, the starter pin serves as a fulcrum, allowing you to control how quickly the depth of cut increases.

FEATHERBOARDS DO THE JOB

F

A featherboard's slanted fingers resist any backward forces, helping you maintain control of a workpiece even if kickback occurs.

ROUTER-BIT SPEED CHART

Bit diameter	Maximum speed* (in rpm)
up to 1"	24,000
1⅛–2½"	16,000–18,000
2⅝–3"	12,000–14,000
3⅛" or larger	10,000–12,000

*Manufacturer's recommendations take precedence over these guidelines.

Master the mitersaw

Prevent kickback on your mitersaw by equipping it properly and polishing your technique.

How it happens: Internal stresses released during a cut, or a workpiece not held firmly against the fence or table during the cut, can cause a kerf to close around the blade, pinching the blade. Because the blade rotates toward the fence and the head of the saw pivots up and down, kickback throws the head upward. The board may also bounce back at you. Short cutoffs can jam between the blade and fence, or be thrown through the gap in the fence.

How to prevent it: First, support the workpiece so it remains flat on the table and the cut ends don't pivot up unexpectedly when completing the cut. Secure the workpiece so no gaps appear between it and the fence near the blade [**Photo G**]. Simply flipping a crooked workpiece removes any gap behind the cutline [**Photo H**]. When possible, use a hold-down on the keeper side to prevent it from shifting. Because the cutoff has no hold-down, it will move safely away from the blade if it twists or bows. When using a stopblock to help cut pieces to consistent length, hold on to the piece between the blade and stopblock, or secure it with a hold-down.

Using the right type of blade also lowers kickback chances. Choose a blade with 60 or more teeth to reduce the bite each tooth takes. Specialized mitersaw blades also have a near vertical, or even negative, tooth-hook angle to prevent the teeth from grabbing the work like a claw [**Drawing**]. Allow the blade to come up to full speed before lowering it into the board and, to maintain the blade's speed throughout cuts, especially on low-powered saws, use a thin-kerf blade. Because it removes less material, it requires less power.

Know too that sliding compound mitersaws operate differently from standard mitersaws. Before starting the cut with a "slider," pull the motor/blade housing fully forward, above and in front of the workpiece. Start the saw; then push the blade down and back to make the cut. This pushes the blade into the workpiece against the rotation of the blade. Don't pull the blade forward during a cut; it will want to accelerate across the workpiece back toward you, like a lugged tire digging into dirt.

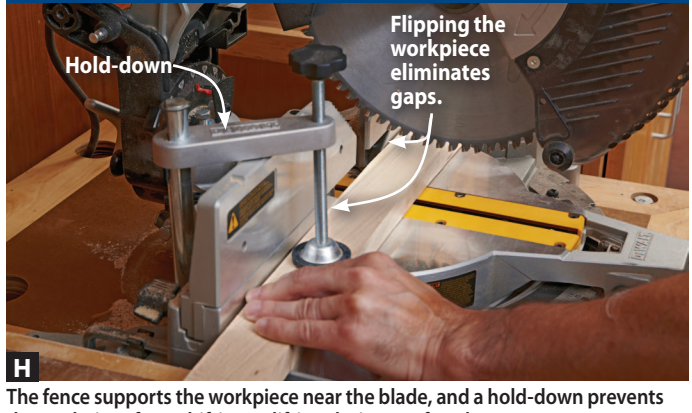
Sliders can also make simple plunge cuts, like a regular mitersaw, without the blade traveling along the bars. Before making a plunge cut, push the head back fully, and lock it in position on the bars to prevent any forward motion during the cut.

When leaving a cutoff of 2" or less, attach a simple zero-clearance insert to both the table and the fence [**Photo I**]. This closes the gaps, preventing a cutoff from wedging into a gap and jamming against the blade, or from being flung behind the fence where it can strike other parts of the saw or the wall and ricochet back at you.

DON'T DO THIS! A GAP INVITES KICKBACK

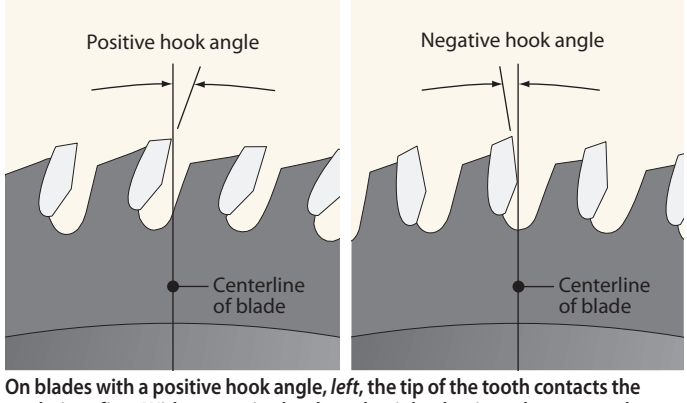
With gaps behind the cutline, the rotation of the blade can shift the workpiece backward, pinching the blade.

SUPPORT PROVIDES CONTROL



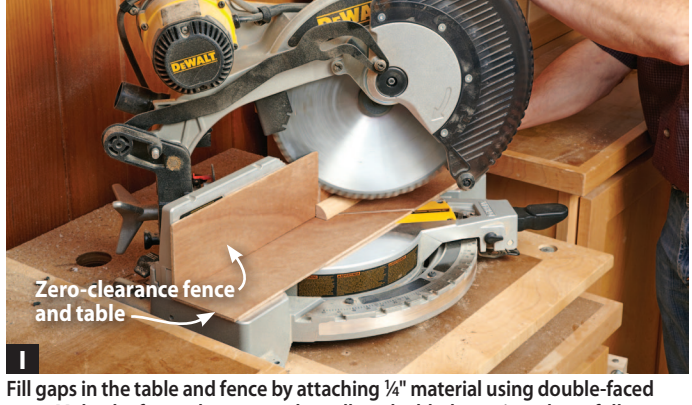
The fence supports the workpiece near the blade, and a hold-down prevents the workpiece from shifting or lifting during or after the cut.

HOOK ANGLES



On blades with a positive hook angle, *left*, the tip of the tooth contacts the workpiece first. With a negative hook angle, *right*, the tip makes contact last.

MAKE A SIMPLE ZERO-CLEARANCE FENCE AND TABLE



Fill gaps in the table and fence by attaching ¼" material using double-faced tape. Make the fence short enough to allow the blade to pivot down fully.

Stop jumps on the jointer

With fast-spinning knives removing stock from the full width of a board's edge or face, the jointer can kick a workpiece back if you don't follow some simple safeguards.

How it happens: The rotation of the cutterhead wants to lift and push the workpiece backward. A too-deep cut presents more material than the knives can remove, so they instead propel the board back. A too-deep cut can occur suddenly if the leading edge of a workpiece tips down as you begin jointing.

How to prevent it: Set the tool's depth of cut to ⅛" or less when jointing stock up to 3" wide, and 1/16" or less for material wider than 3" so the knives don't bite off more than they can chew. Pay extra attention when jointing pieces 12" or shorter so that they don't tip into the cutterhead, and don't joint pieces less than 8" long.

Be aware that the front edge or corner of a piece with a pronounced crook or twist can drop into the gap between the infeed table and knives, causing kickback. To prevent this, begin the cut by dropping the leading edge onto the outfeed table and joint only the trailing edge [**Drawing**]. Repeat this process until you have enough flat surface to support the board as you joint the leading edge.

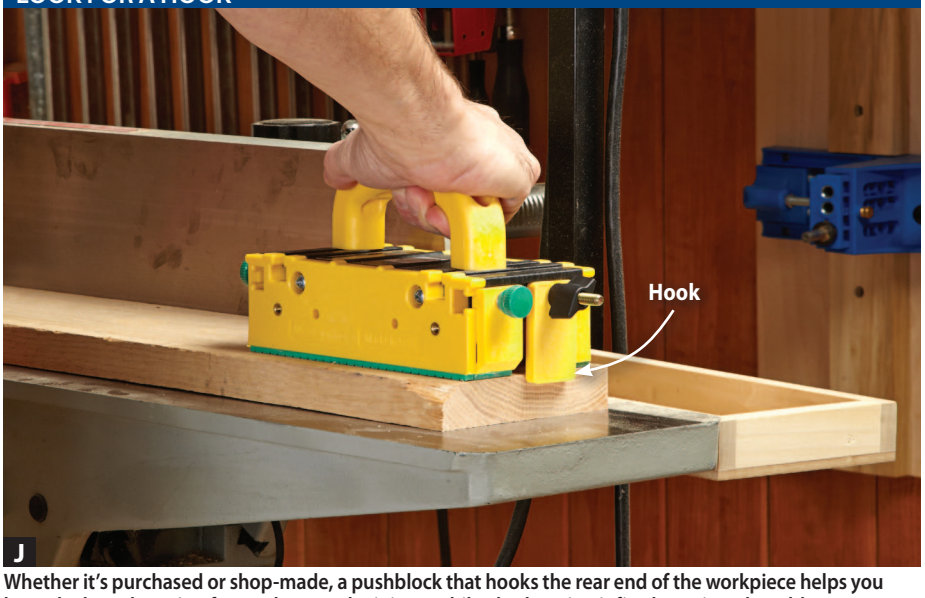
Once you begin jointing, never reverse your direction; moving the workpiece in the same direction the knives spin invites a kickback. To help you keep the workpiece moving, use a pushblock that hooks over the end of the board [**Photo J**]. It provides the most control and keeps your hands out of harm's way if a kickback occurs.

Don't force a board through a cut. The jointer should slice through the wood without excessive effort from you to move it forward. If you find yourself pushing ahead too hard, ease up on your feed rate, and complete the cut before shutting off the machine. Inspect each of the knives for sharpness, and replace them if needed. If they check out, reduce the depth of your cut.

Jointing end grain increases chances for kickback—and frankly, we can't think of a reason to do it. Run your hand over the ends of a broom's bristles and you get an idea of what the jointer knives face with end grain. To true up the ends of a board or panel, take it to the tablesaw, use a hand plane, or mount a straight bit in your router and guide the router along a straightedge.

Produced by **Craig Ruegsegger**

LOOK FOR A HOOK



Whether it's purchased or shop-made, a pushblock that hooks the rear end of the workpiece helps you keep the board moving forward across the jointer while also keeping it firmly against the table.

More Resources

- Get a free article that walks you through a comprehensive tablesaw tune-up at: **woodmagazine.com/tstune**
- Read free articles with more about setting up and properly using the jointer and the mitersaw at: **woodmagazine.com/jointertips** and **woodmagazine.com/mitersawtips**
- Purchase videos about using the tablesaw and mitersaw at **woodmagazine.com/mitersawvideo** **woodmagazine.com/tsbasics**

JOINTING A BOWED BOARD