How woodworkers tame tearout

ZERO-CLEARANCE TRICK APPLIES TO ALMOST EVERY TOOL IN THE SHOP

BY ASA CHRISTIANA

Wood is an amazing material, widely available in all sorts of colors, with beautiful grain patterns. It cuts easily with small machines and tools—products that are accessible to the home craftsman—and its strength-to-weight ratio rivals high-tech materials. But it *is* organic, and therefore comes with some strings attached.

One is movement, and there is no stopping it. The other is tearout. A budding hobbyist soon encounters splintered edges and pockmarked surfaces, damage that grows more obvious when finish is applied. It happens with almost every tool in the shop. The good news is that it can be stopped, in most cases easily.

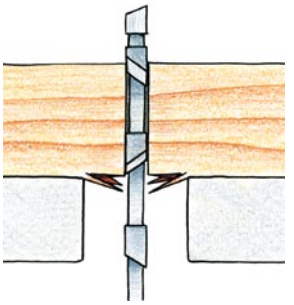
Tearout happens when wood is cut and its plant fibers aren't held firmly in place. There are two main types: One happens when wood is cut across its grain, and the other when the surface is planed. I'll start with crosscutting, which is the easiest to handle.

Crosscut with no worries

Ripping happens along the grain, and generally causes little to no tearout. The few long fibers involved simply shear away from each other. But crosscutting applies pressure across every fiber in a board. That's fine through most of the cut, but near the bottom or back edge, the last few fibers have nothing behind them and would much rather splinter away than be sliced through. On most tools,

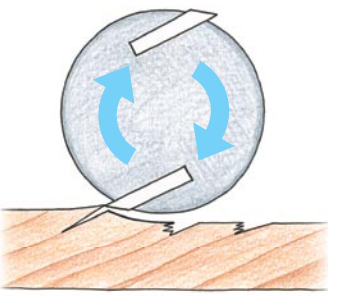
Two main types

TEAROUT FROM CROSSCUTTING



Chip off the old block. *At the bottom and back edge of a cut, unsupported surface fibers tend to splinter away, leaving a ragged surface.*

TEAROUT FROM PLANING

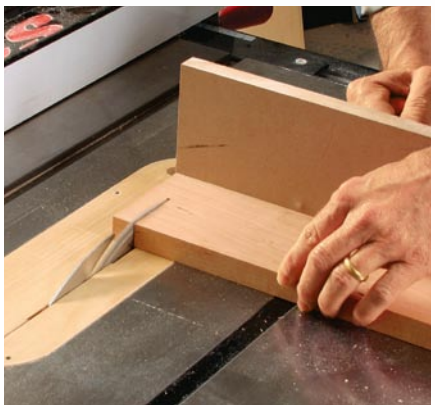


Scarred surface. *Jointers, planers, and handplanes can lift surface fibers and break them instead of cutting them cleanly, leaving pockmarks in the surface.*

Photos: Steve Scott; drawings, this page: John Tetreault

Zero clearance for tablesaws

Replace your tablesaw insert. *A zero-clearance throat plate helps control tearout by supporting the fibers on the bottom of a workpiece.*



Add support to your miter gauge, too. *A hardwood or MDF fence screwed to the front of the miter gauge will prevent the wood from splintering at the rear of the cut.*

CROSSCUT SLEDS

Also works on sleds. *Clamp a piece of ¾-in. MDF to the fence and tack down a sheet of ¼-in. plywood. Then cut a new slot to match the crosscut or dado you plan to make.*

there is nothing there to stop them.

Manufacturers build those tools to make both square and angled cuts, so the opening in the table or fence needs to be extra large to allow the blade to be tilted. Carpenters don't mind, because tearout doesn't matter on framing, and they usually can hide the bottom side of a trim- or deck board. But furniture makers can't always hide a splintered edge, and they quickly learn to close up that big gap with a "zero-clearance" plate, usually just a piece of plywood tacked or clamped onto the tool.

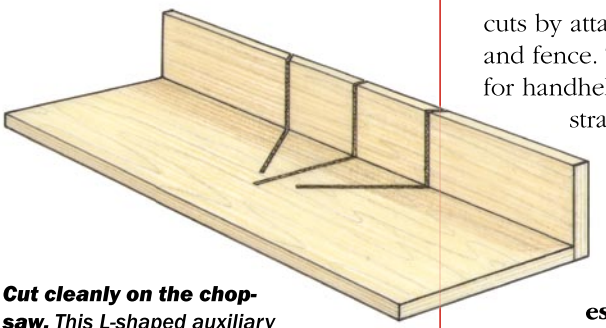
The principle is always the same: The blank plate is attached, and the sawblade is used to cut a kerf through it. Then, when wood is crosscut on top or in front of that plate, the lower or back edge is supported completely on both sides of the blade. Granted, that plate will need to come off or be replaced for angled cuts, but most cuts are at 90°.

Saws are simple—On tablesaws, you should replace the throat plate (the one with the big slot) with a blank plywood one for all square cuts (See Fundamentals: "Get safer, cleaner cuts on your tablesaw," *FWW* #200). But you can use a zero-clearance plate on the miter gauge fence, too, to support the back edge of the cut. This is nothing more than some plywood or MDF (medium-density fiberboard) screwed to the existing fence.

The same goes for any crosscut sled you build for the saw: You can tape or tack sacrificial surfaces onto the base and the fence. Don't use thick pieces on the base; you'll steal too much of the blade's height capacity. Later, when the zero-clearance slots on these plates get beat up by angled cuts or different-size blades, you just attach new

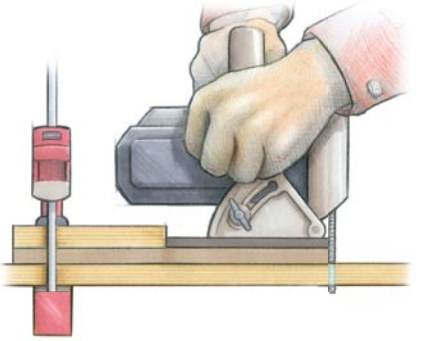
Zero clearance for other tools

MITER SAW



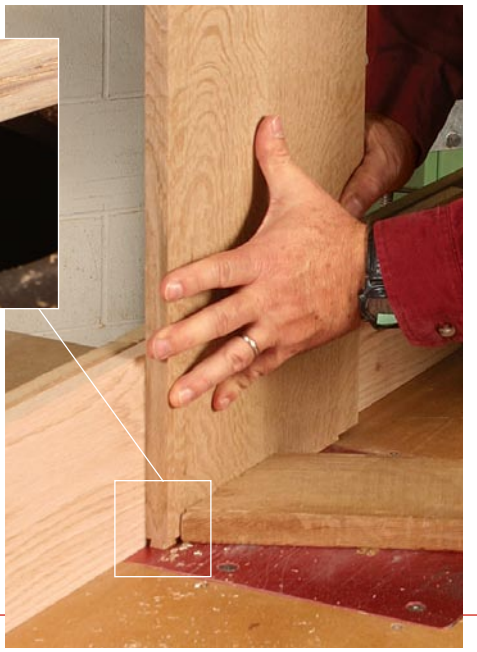
Cut cleanly on the chopsaw. *This L-shaped auxiliary table supports the bottom and rear of the stock when cutting small parts.*

CIRCULAR SAW



Get straight, square edges without splinters. *A shopmade cutting guide keeps a handheld circular saw on a straight line. The MDF base helps support the fibers on the top surface, where the blade exits the cut.*

ROUTER



Bury the bit in a sacrificial fence. *A clean cut is crucial for delicate joinery like these sliding dovetails. Attach an extra board to the fence, then pivot the assembly into the spinning bit.*

Torn fibers vs. a clean cut. *The zero-clearance fence supported the wood adjacent to the cut on the lower piece, preventing tearout.*

ones. On miter- and chopsaws, you can eliminate tearout on both square and 45° cuts by attaching similar plates to the bed and fence. The principle even holds true for handheld power tools. A shopmade straightedge jig for a circular saw uses the same zero-clearance idea to eliminate tearout on at least one side of the cut, where it matters most.

Same deal for drill presses and router tables—Although these don't exactly crosscut wood, they cut across the fibers in a similar way. And you use the exact same treatment.

Most drill presses have a big hole in the cast-iron table to accommodate the largest drill bits. Without a backer board under your workpiece, you'll get terrible blowout on the bottom side of the hole you are drilling. A simple piece of plywood or MDF prevents this. Just move it around to get a solid surface under each new hole.

On router tables, the force of the spinning bit is horizontal, so you will sometimes need a zero-clearance plate on the fence, but almost never in the table. There are a number of ways to do it: Make the whole fence sacrificial and replaceable, attach a thin blank plate to the fence, or design a fence with replaceable inserts.

Surface tearout is trickier

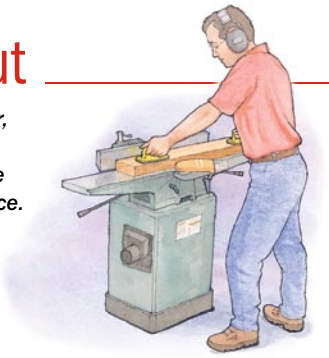
Jointers, planers, and handplanes all can create nasty tearout in wood surfaces, especially when they hit grain that changes directions. But the power tools require a different approach than the hand tools.

I don't believe there is a way to use the zero-clearance principle on the jointer and planer (it's difficult to get support close to the spinning cutterhead), but there are other ways to reduce tearout. Cut with the grain as much possible. If you are getting tearout, try reversing direction. Also, try replacing dull knives with sharp ones. Sometimes it also helps to dampen the surface with water before sending the board through. Handplanes, on the

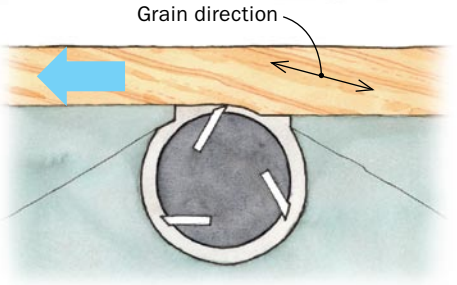
Drawings, this page: Bob La Pointe

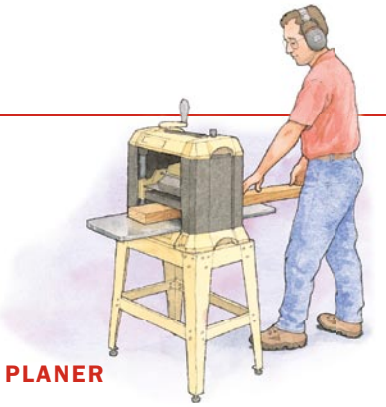
Strategies for surface tearout

Pay attention to grain direction. *On the jointer, the edge grain should run downhill toward the rear of the board. On the planer, the downslope should point to the front of the workpiece.*

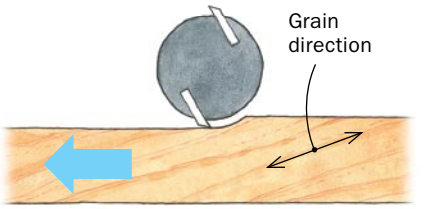


JOINTER





PLANER



other hand, do benefit from the zero-clearance principle, or, more accurately, the tight-clearance principle.

The force of the blade tends to pry fibers upward, while the plane's sole holds them down. A tighter blade opening puts the sole closer to the front of the blade and prevents the fibers from lifting during the cut. For the final, critical passes on a board, resharpen the blade, set it for a fine cut, and adjust the mouth to a very tight opening.

Depending on the plane, you either adjust the frog forward or adjust the toe of the sole backward to close the mouth. And on planes with a chipbreaker, it helps to place it as close as possible to the tip of the blade, so it applies additional downward pressure on the chip as it curls it, fighting its tendency to tear upward.

Last, when tearout is unavoidable, use scrapers and/or sandpaper to work past it and produce a flawless surface. □

TIP

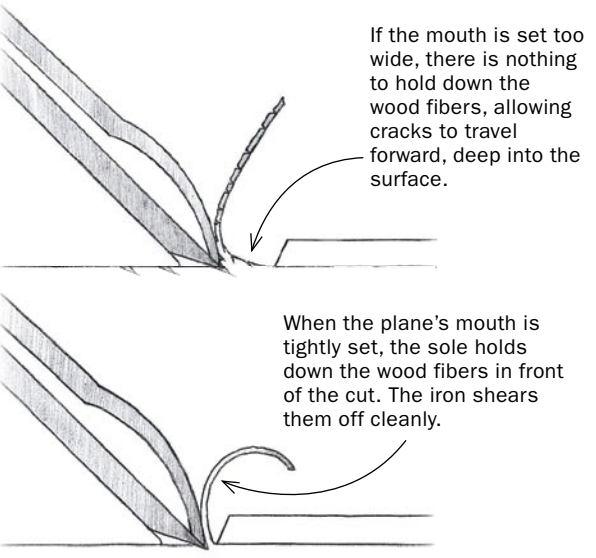
DAMPEN THE BOARD

Dampening the face of the board softens the surface fibers slightly, making them easier to cut and less likely to tear out.

HANDPLANES

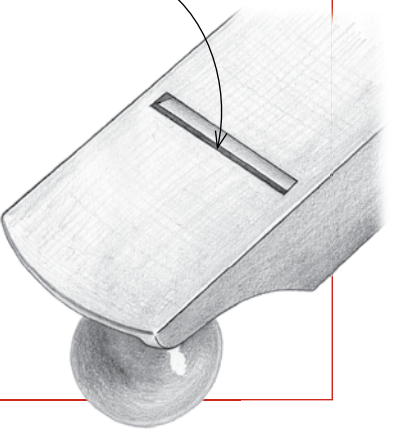
The goal. *A properly set up handplane with a sharp iron should produce thin, fluffy shavings like these and a glassy surface with no tearout.*

HOW TEAROUT HAPPENS



SET UP THE PLANE FOR A CLEAN CUT

Move the frog (blade carriage) forward to create a tight mouth opening. For fine cuts, open the mouth 1/64 in. to 1/32 in.



Drawings, this page: Jim Richey (top); John Tetreault (bottom)