

Best Way to Fit Tenons

Machines will get you close,
but a only handplane
will deliver a piston fit

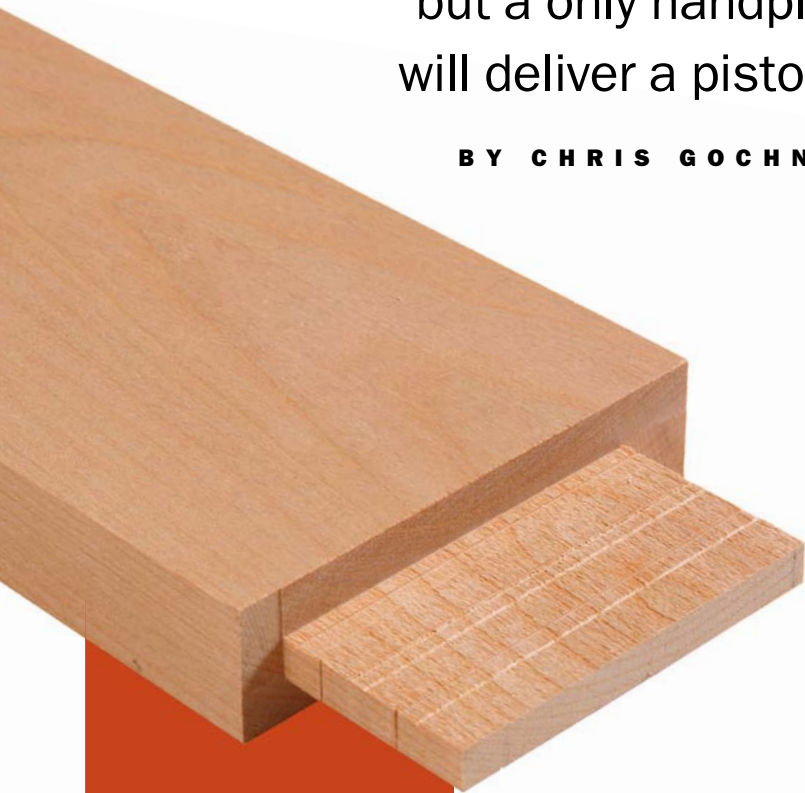
BY CHRIS GOCHNOUR

A lot of woodworkers choose to cut tenons with a tablesaw, thinking it will be fast and dead-on, only to get frustrated when their “precise” setup results in ill-fitting cheeks or misaligned shoulders. Truth is, it’s hard to cut perfect-fitting tenons using just machinery, whether a tablesaw, a router, or a bandsaw. A better approach is to cut the tenon close and dial in the fit using hand tools. But is there one that’s best for the job?

To find the answer, I compared shoulder planes, rabbit block planes, fillister planes, and bullnose planes to see which one is best for trimming tenon shoulders and cheeks. All are essentially planes designed to cut into corners, leaving crisp, square edges and removing material methodically in a way that power tools cannot.

What to look for in a tenon trimmer

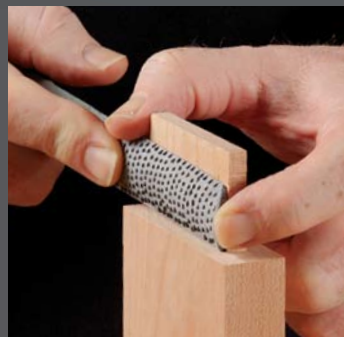
For a plane to be effective at trimming tenon cheeks and shoulders, it must have some basic characteristics. First, it must be adept at cross-grain and end-grain cuts, so it should have a low cutting angle. Precision manufacturing also is critical, and the way the blade aligns with the body is important for peak performance. The blade should silhouette the body accurately, projecting slightly (about 0.002 in.—the thickness of a sheet of paper) beyond each side and parallel with the sole to achieve the desired amount of cut. If the blade projects



MACHINE-CUT TENONS NEED A HELPING HAND

Using a tablesaw, router, or bandsaw to cut tenons certainly makes the job faster and more efficient. But even with a careful setup, there are bound to be slight inconsistencies in the cuts, such as a shoulder that has a step. The path to a piston fit is to cut the tenons close, and then trim them using handplanes.

Wrong tools are hard to handle



You may be tempted to file, sand, or chisel your way to perfect tenons. But these methods are inconsistent. Files and sandpaper tend to round over the work, especially in the corner, and it’s difficult to control a chisel over a longer surface without creating a taper.



Why planes work better

Shoulder planes and rabbet block planes reach into corners and remove material methodically in a way that power tools cannot, and they're more precise than files, sandpaper, or chisels. With each one, the blade should project slightly beyond the side (about 0.002 in.—the thickness of a sheet of paper) for best performance. If it doesn't project enough, the plane is pushed away from the corner and won't remove stock evenly.

Trim a tenon for a perfect fit

The key to achieving a piston fit is working methodically. Cut the tenon on the tablesaw (or other machine), and then carefully trim the shoulders and cheeks with a shoulder plane and rabbet block plane.

TIP HOW TO DIAL IN MACHINE CUTS



To reduce the amount of hand-trimming you need to do, cut the tenon close enough that a corner just fits into the mortise. Subsequent handwork will be quick.

excessively from the side of the plane, it will dig into and mark the joint's side. If it doesn't project enough, the plane is pushed away from the corner and produces a sloping or wandering cut.

The sole of the plane should be flat and the plane sides should be perfectly square to the sole. The blade should hold up to the rigors of end-grain planing. As with any handplane, the depth and lateral adjustments should be easy and should hold. Finally, since these planes may be used in multiple positions, the body should be comfortable to grip with one or two hands.

The right planes for the job

I used all of the planes on tablesawn tenons to fine-tune the shoulders and cheeks, a job that involves tricky end-grain and cross-grain work. The stock was cherry, and the tenons were $\frac{1}{4}$ in. thick by 4 in. wide by $1\frac{1}{4}$ in. long. I judged the planes based on the test, as well as on their fit and finish and ergonomics.

After all the testing, bullnose and fillister planes fell out of contention (opposite page) while shoulder and block rabbet planes

SHOULDERS

Lower the step. One of the most common problems with a tablesawn tenon is a step (right), or uneven shoulder that leaves a visible gap in the joint. To fix it, take a light pass with the shoulder plane (below), toward the step, starting near the middle. Take progressively longer strokes until the step is almost gone.



Then level the shoulder. Once the step is almost gone, go back in the other direction. One advantage of the shoulder plane is that you can pull it easily toward you. One or two passes should do the trick.

CHEEKS

A wide berth. To trim long tenons with a shoulder plane (right) requires overlapping passes, which could taper the tenon if you're not careful. The wider rabet block plane (below) is more efficient and helps ensure a flat surface.



rose to the fore. With their low cutting angle, both of these planes handle end-grain and cross-grain cuts. And they're made for use with one or two hands, so you can hold them in a number of positions to handle any trimming job. (For head-to-head comparisons of all the shoulder and block rabet planes, see pp. 44–45.)

I'd recommend buying a shoulder plane first, and adding a rabet block plane later (see "Which ones to buy, and in what order, p. 45).

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FILLISTER AND BULLNOSE PLANES DON'T MAKE THE CUT

Bullnose and fillister planes are not designed to trim tenon cheeks and shoulders. The bullnose plane has too short of a nose and does not register properly to start a cut. The fillister is really a joint-making tool, made for cutting rabbets and raised panels. It's not designed to be used on its side for trimming shoulders, and it's too long to use with one hand, a necessary trait for trimming tenons with the workpiece supported on a bench hook.



Stub nose is a problem. The short nose of a bullnose plane doesn't give you much room to register the tool on a tenon, so you could inadvertently round over the edge as you work.



Better for raised panels. With its long body and a two-handed grip, the fillister plane can work for trimming wide tenons on breadboard ends. However, it is better suited for creating joints, such as rabbets, and for raising panels by hand (left).

Shoulder planes: The first choice for tenons



Shoulder planes excel at trimming the shoulders of tenons. But they also are great for sizing tenon cheeks (see previous page). Shoulder planes range in width from ½ in. to 1¼ in. For furniture making, I prefer the larger models, ¾ in. or bigger, which are more efficient, covering more ground while still handling narrow shoulders well.

If a manufacturer offered different sizes of the same tool, I tested the largest one offered. I judged the planes based on how well they worked at trimming the shoulders and cheeks of tenons, as well as their fit and finish (flat sole, with sides perfectly square to the sole). I also evaluated the ergonomics of each one, and whether it is comfortable to hold with one or two hands.

Among this group, the Veritas model stood out, and I picked it as Best Overall and Best Value.

MODEL/SOURCE	WIDTH	EASE OF BLADE ADJUSTMENTS	FIT AND FINISH	PERFORMANCE	COMMENTS
Clifton 420 toolsforworkingwood.com \$290	¾ in.	Good	Very good	Good	Blade needed lapping out of the box; mouth not adjustable; blade shifted laterally during depth adjustments.
Clifton 3110 (3-in-1) toolsforworkingwood.com \$290	1½ in.	Good	Very good	Good	Blade needed lapping out of the box; mouth adjustments, made via shims, were difficult; blade shifted laterally during depth adjustments.
Gordon Gidgee hntgordon.com.au \$185	1 in.	Good	Excellent	Good	Blade adjusted with a hammer, which takes practice; blade projection on top made plane hard to grip; mouth not adjustable.
Lie-Nielsen Large lie-nielsen.com \$250	1¼ in.	Good	Very good	Very good	Solid performer; casting recesses have sharp edges; blade shifted laterally as depth was adjusted; mouth easy to adjust.
Shop Fox 28 (3-in-1) woodstockint.com \$75	1⅜ in.	Good	Good	Fair	Blade was poorly prepped and failed on end grain; mouth adjustments, made via shims, were difficult; sole not flat.
Shop Fox 92 woodstockint.com \$55	¾ in.	Very good	Fair	Fair	Blade needed lapping out of the box and needed reshaping to make it parallel to sole; blade failed on end grain, mouth easy to adjust.
Stanley Sweet Heart 92 woodcraft.com \$125	¾ in.	Excellent	Good	Fair	Sharp edges on body made tool uncomfortable to grip; blade projection was inadequate, making for inconsistent results; mouth easy to adjust.
Veritas Large leevalley.com \$225	1¼ in.	Excellent	Excellent	Excellent	Flawless tool; very comfortable to grip with one hand or two; blade lapped dead flat; mouth easy to adjust.



Rabbet block planes: Better for cheeks



Skew is the best. The blade on the skew rabbet block plane (above) is angled, which pulls it against the shoulder and leaves no tearout at the back of the cut. A normal rabbet block plane (right) cuts in both directions, making it more versatile.



With its wider blade, bedded at a low angle, a rabbet block plane is well suited to trimming the cheeks of a tenon efficiently. It can work on shoulders, but it's not as easy to use on its side as a shoulder plane. These planes are versatile, also working well as conventional block planes.

After putting all the planes through the same tenon-trimming tests as the shoulder planes, I picked the Veritas skew block plane as the Best Overall. Its skewed blade rabbets on only one side but cuts with less resistance and produces a flawless surface with no tearout. Buy the version that suits your favored hand and cutting direction.

But there's a learning curve associated with sharpening the angled blade, and perhaps some extra honing accessories to buy. For folks who don't want to deal with those issues, I'd recommend the Lie-Nielsen 60½ R as a Best Value buy.



LIE-NIELSEN 60½ R



LIE-NIELSEN SKEW BLOCK



VERITAS SKEW BLOCK

Online Extra

For tips on sharpening a skew blade, go to FineWoodworking.com/extras.

MODEL/SOURCE	EASE OF BLADE ADJUSTMENTS	FIT AND FINISH	PERFORMANCE	COMMENTS
 Lie-Nielsen 60½ R lie-nielsen.com \$175	Good	Very good	Very good	Cut quality is good; square, full-width blade rabbets on both sides; depth adjuster tended to shift blade laterally, so you must be careful.
Lie-Nielsen Skew Block Plane lie-nielsen.com \$225 (left or right handed)	Good	Excellent	Very good	Cut quality is very good; bronze body increases mass and heft, won't rust; depth adjuster tended to shift blade laterally, so you must be careful.
 Veritas Skew Block Plane leevalley.com \$215 (left or right handed)	Excellent	Excellent	Excellent	Cut quality is excellent; easy to set up and holds settings with the help of setscrews on side of body to align blade; extremely comfortable to hold.

Which ones to buy, and in what order

With its tall body, a shoulder plane is ideal for trimming tenon shoulders, offering great control while keeping your hands away from the work. It also can be used to trim tenon cheeks. Buy the biggest one you can (see recommendations, opposite page), which can handle any size shoulder and any tenon cheek.

The problem with a shoulder plane, even a large one, is that it's not the most efficient tool for cheeks, requiring multiple overlapping passes to tackle long tenons, which could result

in a tapered tenon if you're not careful. That job is best handled by a rabbet block plane, which has a wider blade (see recommendations, above). Though it can be used on a shoulder, its short body is a bit harder to hold on its side.

Out of both, the first one I'd recommend is the large shoulder plane, because it can do both shoulders and tenons pretty easily. Ideally, though, if you can afford it, add a rabbet block plane for cheeks. With both tools you'll be set up to trim tenons perfectly every time, quickly and efficiently.