FAT LINES
A lumber crayon and fat pencil show up well on rough lumber.

FINE LINES
A sharp No. 2 wood pencil and a 0.5mm mechanical pencil each has its advantages, while a ballpoint pen can be the best choice on dark woods.

INCISED LINES
For precise layout, a knifed line is often best. The X-Acto is beveled on both faces; the marking knife is beveled on one face, and the scratch awl comes to a point.

Learn Your Lines

Layout lines vary, and understanding when to use each type is fundamental to fine work

BY JEFF MILLER

Photos, this page: John Tetreault

GUIDED LINES

A cutting gauge or disk-type marking gauge (top) cuts like a single-bevel knife, while a traditional marking gauge (bottom) cuts like an awl.

Cutting to the line is a simple concept. Hidden within that simple idea is a complex set of skills that are a gateway to accurate work.

The way you lay out lines and the way you cut to them are different in different contexts. Take cutting out curved parts vs. sawing dovetails: You'll almost always smooth out a curved part after cutting, which gives you a chance to refine the shape afterward. With dovetails, on the other hand, the goal is to get the joint to fit with as little adjustment as possible. This requires added precision in the layout as well as the execution.

These two tasks are just the beginning. Here, I'll take a close look at the various layout lines in the life of a project. Some are penciled, rough or fine; others are scribed with a knife or marking gauge. Each has its purpose. Master the subtleties, and your work will rise to a new level.

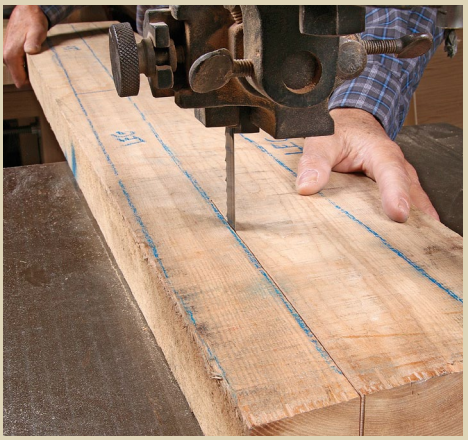
Three levels of layout

Layout tasks can be grouped into three categories: rough layout, mid-level layout, and fine layout. Each calls for a different approach. Rough layout, done with pencil, chalk, or crayon, includes working out how you'll break down a board into manageable sizes, marking out the grain orientation, and marking reference faces for milling or joinery. Mid-level layout is usually for machine work, where the machine setup will control the precise location of the cuts. And fine layout lines are for precise sizing of parts or joinery, and are actually cut into the

Rough layout

When rough-cutting or milling lumber, visibility is more important than precision.

Bold lines of attack. *Mark out parts on the rough boards with a lumber crayon or fat pencil, factoring in extra length and width. Use a long ruler to align parts with the grain.*



Cutting it close enough. *Follow the rough lines on the bandsaw. These cuts don't have to be perfect. Make crosscuts with a miter saw or circular saw.*

Milling marks. *When you mill parts, use a fat pencil or a crayon to mark reference faces.*

Mid-level layout

These lines must be accurate and easily visible, designed to get the machine setup as close as possible. Make test cuts to creep up on a perfect fit.

BANDSAWN CURVES

These don't often mate with any other surface, so the exact curve isn't critical. Use a template to ensure consistency, and mark a very visible line for bandsawing.

Trace and cut. *A pen shows up well on walnut, marking a line that's offset from the template (right). Now you can bandsaw right along the edge of the line (below), leaving a thin, consistent amount of waste to remove.*

MARKING PARTS IN PLACE

Once a project is partly assembled, it's often easier to size some parts by fitting rather than measuring.

Mark in place. *Miller fits one end of a backboard into its rabbet and uses the opposite rabbet to mark the far end of the board.*

Cut and test. *Use a tablesaw or miter saw to crosscut the board close to the mark, and then try the fit. When it's perfect, crosscut other backboards with the same machine setting.*

wood as opposed to being simply marked on it, using a knife or point-shaped tool.

Coarse vs. fine marked lines

For rough layout—when breaking down rough lumber and labeling parts, for example—a lumber crayon, chalk, carpenter's pencil, and a fat 6mm artist's pencil are ideal. Go with the crayon or fat pencil if you need the marks to remain visible for a while. Save the chalk for marks that you want to easily brush or rub off.

For mid-level layout such as marking curves to be cut on the bandsaw, pens and sharp pencils are best. Keep in mind that tracing a pattern means your layout will be slightly bigger

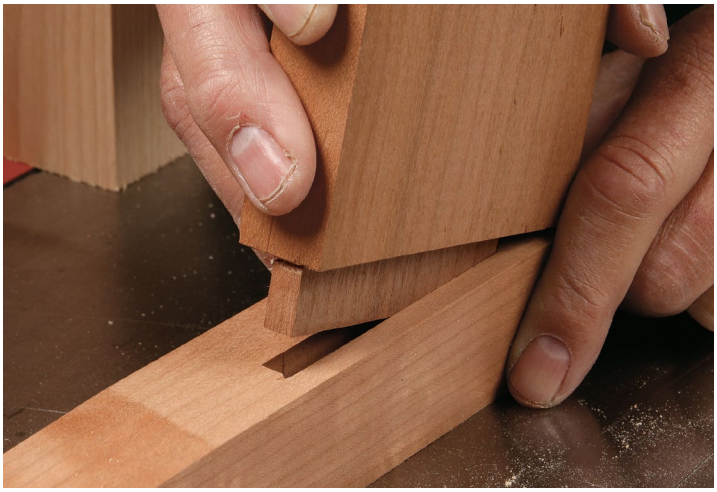
Photos, except where noted: Asa Christiana

TABLESAWN TENONS

Use a sharp pencil to transfer key dimensions from the mortised piece and lay out the tenon. The final fit is dialed in with test cuts on the tablesaw.

Mechanical layout. *For machine-cut joinery, Miller does layout with a mechanical pencil for its uniform line. He transfers the mortise dimensions, then uses them to lay out the entire tenon (below).*

Fine-tune the machine setup. *At the tablesaw use the pencil lines as a guide (left), but dial in the fit by testing the tenon in the mortise (below). Now you can cut other tenons with the same settings.*



than the original pattern. This is usually a good thing, since there will be some smoothing to do after bandsawing out the part.

With machine-cut joinery, accuracy comes from the machine setup not the layout, so while it's important to have accurate lines it's even more important to check the results and refine the setup with test cuts. Fitting a tenon to a mortise is a good example. When sneaking up on a fit, the fine pencil line gives you a starting point before you make the minute adjustments needed for a perfect fit. In most cases, you want to leave the line intact with your first cut. Align the cut with the waste edge of the line. (None of this works if you don't keep track of which is the waste side—I often use an X to mark it.)

Choose your weapon— When drawing fine lines on wood, each type of pencil has its advantages and disadvantages. A regular wooden pencil can be sharpened to a very fine point, but it will dull quickly, especially on coarse-grained wood. A mechanical pencil gives you a more consistent line thickness, most commonly 0.7mm and 0.5mm. But the leads tend to break. Although there are many hardnesses of pencil available in wooden or mechanical versions, I find No. 2 and HB to be the most useful.

Don't neglect the heretical possibility of using a pen for mid-level layout. Pen lines are

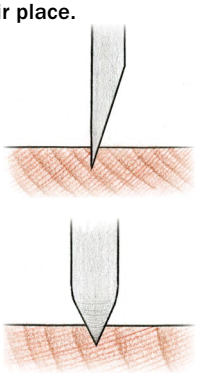
Photo, top right: John Tetreault

Fine layout

Incised lines are the secret to accurate handwork. They guide chisel cuts and sawcuts, and often end up as the finished edge.

KNIFE VS. POINT

A single-bevel knife and a disk- or knife-style marking gauge cut a narrow line with one square side and one beveled, while an awl or traditional marking gauge plows a wider, V-shaped groove. All have their place.



TRACE A HINGE

It's easy to strike a knife line perfectly flush with a ruler or reference edge, such as when installing a hinge.

Get the angle right. *When using a double-bevel knife like an X-Acto to scribe a hinge mortise, make sure to angle the blade so the bevel on one side rides flat against the reference surface.*

consistent in thickness and much easier to see, especially on dark woods. And in most cases you'll remove the ink with a handplane, scraper, or sandpaper.

Scribed lines for fine layout

A scribed line gives you a more precise target to work toward than a pencil line. These incised lines are indispensable for accurate handwork, providing a place to put the edge of a chisel so you can pare or chop a joint for a perfect fit. They also let you pare a little notch for starting an accurate sawcut.

There are a variety of tools for incising lines into wood, and these tools cut two different lines: point-scribed—those created with a sharp-pointed "scratch" awl or a pin-style marking gauge—and knife-scribed. Each has its proponents. I use both, with specific tasks assigned to each.

Point-scribed lines—These lines work well along the grain but not across it, where the points tend to tear the wood fibers and leave a ragged line. Angling the tool forward in the direction of the cut so the pin is trailing slightly reduces tearout, improving the quality of the line.

Another important factor is how you hold a pointed marking tool against a straightedge or reference piece. The angle of the tool will change the location of the line slightly, so keep the point of the tool tight to the guide surface.

Point-scribing tools—Some marking gauges use a pin sharpened to a point for scribing. I usually avoid them, because knife-style gauges are superior. But there's an exception. Marking gauges with two pins are very useful for mortise-and-tenon work. With one setting you can mark out both parts of the joint. Cutting inside the lines for the mortise and outside the lines for the tenon leads to accurate results.

Photo, bottom left: John Tetreault

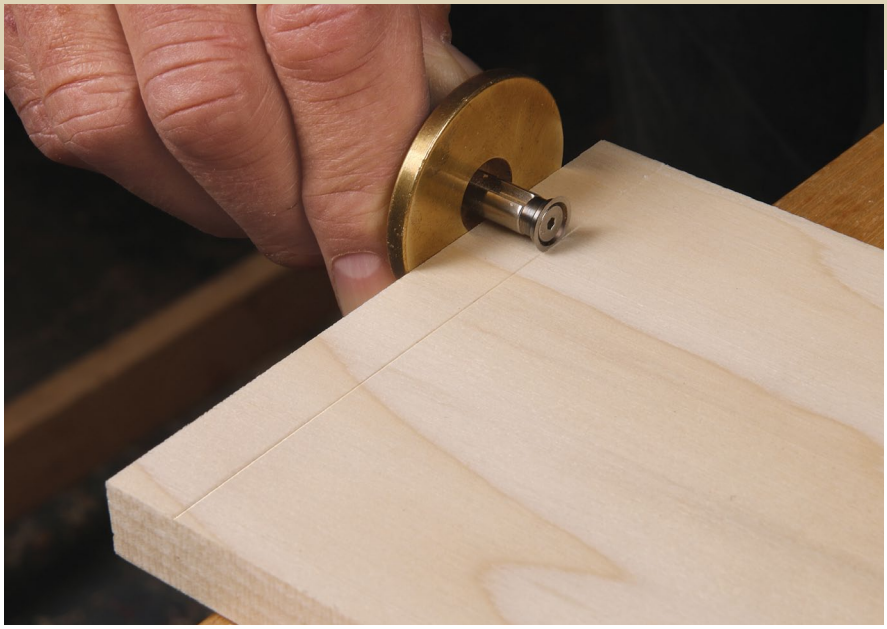
The other useful point-scribing tool is a scratch awl. I use mine to transfer a dovetail layout from one part to another. I find this task easier with an awl than a knife, since there is no tendency to cut into the part you're marking from. To transfer dovetail marks around the workpiece, however, I use a flat-sided marking knife.

Knife-scribing—Knives leave sharper, finer lines than points and pins, both with and across the grain, but the fine lines can be hard to see, especially when they are in line with the grain. On the plus side, they cut just as cleanly across the grain as with it.

But the main advantage for knives and knife-based gauges is that they cut a line with a straight side and a tapered side. The straight-cut side is usually the part of the mark that you keep. These lines work exceptionally well for joinery, as they can provide the perfect beginning for a final cut. Get a dovetail baseline or tenon shoulder knife-scribed perfectly, and the scribed line will become the final visible edge. A knife line is also easier to strike perfectly flush with the edge of a ruler or reference edge. However, knives also have a tendency to cut into the reference part they are riding against. To prevent this, hold the knife as vertical as possible and start with a light cut.

Options for marking knives—There are many types of knives available. A cheap, effective option is the X-Acto knife, but because of its double-beveled blade it must be held at an angle so the bevel on one side rides against the reference edge.

Single-bevel marking knives (with one flat face and a small



DOVETAILS

Miller employs three marking tools to cut the various lines he needs.

Disk cuts the baselines. *Use a disk- or knife-style marking gauge here, with its bevel facing the waste area and its square edge starting the square shoulder cut.*

Transfer with an awl. *Miller favors the awl for transferring the pin layout to the tail board (left), as it won't cut into the pins the way a knife can. Then he uses a knife to carry the lines around the corners of the tail board.*

TIP

TUNE UP YOUR AWL

Watch out for awls with a steeper secondary taper near the point, which makes them useless for precise marking. Regrind the tip to a single gentle taper by spinning the tool as you hold it up to a grinding wheel.

MORTISE-AND-TENON BY HAND

To lay out both parts of this joint, Miller relies on the unique capabilities of a few different marking tools.

Mark the mortise first. *A pin-style mortising gauge works well along the grain, marking both walls at once.*

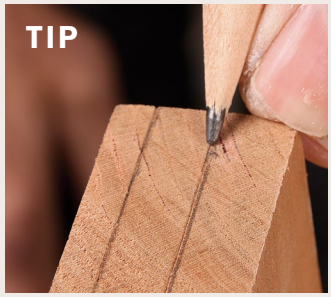
Mark the tenon shoulders and cheeks. *The pin-style gauge works well to mark the tenon cheeks (right) in end grain. But Miller marks the shoulders with a disk- or knife-type marking gauge, which works better cutting across the grain. The tiny bevel faces the waste wood, leaving a square cut at the shoulder.*

TIP

CHISEL WIDENS THE LAYOUT LINES

Use a wide chisel to pare a shallow ramp inside each line. That will leave a more pronounced shoulder to guide the mortise chisel.

TIP



HIGHLIGHT THE LINE

Use a pencil to go over the V-shaped groove left by the pin-style gauge. That will leave a tiny line on each side of the groove. Saw away the waste-side pencil line, leaving the other one, and your joints will be close to perfect.

bevel ground on the other face) are the easiest to hold flat against a reference edge. They come in left- and right-hand versions, or with a spear-point that lets them cut in both directions.

Options for knife-edged marking gauges—Marking gauges with knife edges can make clean scribes both across and along the grain, as well as on end grain. They can have two types of knives: cutting disks and actual tiny knives. Both work well.

Knife-based marking gauges can typically be set to cut a slightly deeper line, helpful when you are using the vertical side of the groove as a final edge. A tenon shoulder is one example. A disk-type cutter leaves the same square edge on one side of the line, but the bevel angle is steeper and the cut is not as deep. This shallower cut can be an advantage when you want to plane or sand it away later. Before making sawcuts to a scribed line, it helps to draw over the fine groove with a pencil. The pencil will actually draw two lines, one on each rim of the canyon. Cut away the waste-side line and leave the other behind, and you will be very close to perfection. □

Jeff Miller builds furniture and teaches woodworking in Chicago, and is a longtime contributor to Fine Woodworking.