Machinist's calipers

WHEN YOU NEED
AN EXACT MEASUREMENT,
NOTHING BEATS THIS PRECISION TOOL

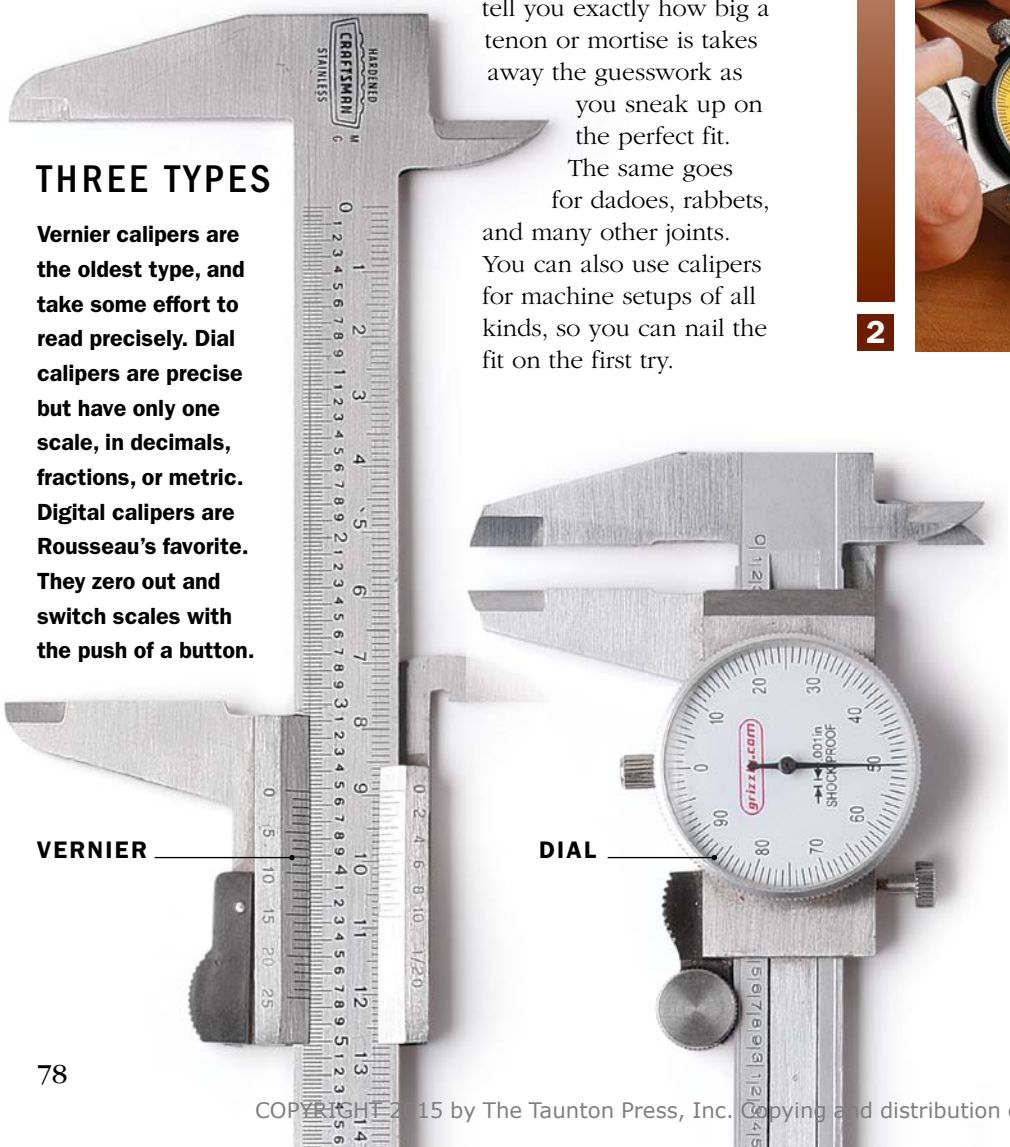
BY TIMOTHY ROUSSEAU

Machinist's calipers may seem like a strange object to find in a woodshop, but when you need to measure something very accurately there isn't a better tool for the job. Consider joinery. For a strong glue bond, a joint should be snug enough that the pieces won't fall apart from gravity alone, but not so tight that they need to be pounded together. That's a small margin of error, and a few thousandths of an inch can make a big difference.

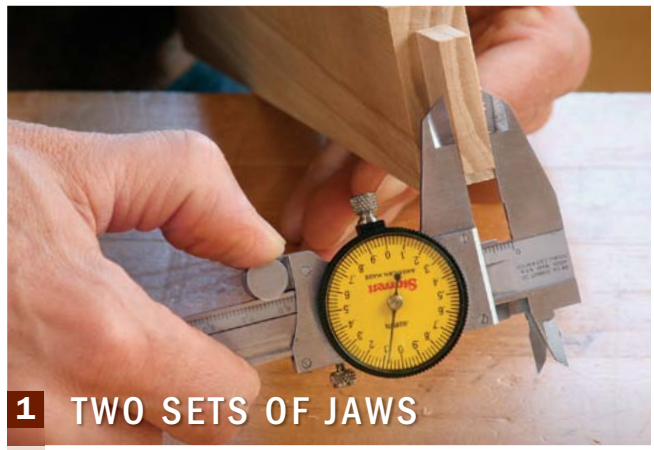
Having a tool that will tell you exactly how big a tenon or mortise is takes away the guesswork as you sneak up on the perfect fit. The same goes for dadoes, rabbets, and many other joints. You can also use calipers for machine setups of all kinds, so you can nail the fit on the first try.

THREE TYPES

Vernier calipers are the oldest type, and take some effort to read precisely. Dial calipers are precise but have only one scale, in decimals, fractions, or metric. Digital calipers are Rousseau's favorite. They zero out and switch scales with the push of a button.



Four ways to measure



1 TWO SETS OF JAWS

Outside for thickness. *Use the outside jaws to measure the thickness of a part such as a tenon, so you know how much more you have to trim off.*

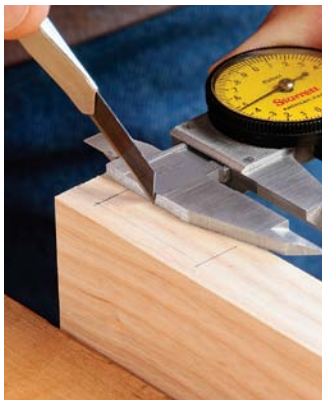
Inside for width. *Use the inside jaws to find out exactly how wide a mortise is before cutting the tenon. They are also great for positioning a jig on a workpiece, and dozens of other tasks.*

2

A mortise-and-tenon joint shows how calipers can provide precise information to achieve perfect results.

3 THE SECRET STEP

Square and steady. *The step on the back of the sliding jaw is often overlooked. It registers squarely against the edge of a workpiece while the end of the tool is used for measuring.*



Measure or mark. *The step lets you use the end of the jaws as a depth stop of sorts, for measuring distances (left). You can also slide the tool along an edge for marking and scribing (right).*

4 THE DEPTH ROD

Find bottom. *A long probe measures the precise depth of any cavity, such as a mortise.*

Add magnets and make machines digital. *Use these standoff magnets from Lee Valley (leevalley.com) to attach calipers to a metal surface, and then use the depth rod to make precise adjustments to fences, jigs, and more.*

Dial or digital, take your pick

There are three types of machinist's calipers. Vernier calipers, with their simple sliding scale and fractional markings, are bombproof but less precise than other types. That's because they are hard to read closely, especially if your eyesight is not 100%.

Dial calipers are very precise but vulnerable to breaking if dropped, especially if you buy a cheap one. They also take a moment to read accurately.

My favorite type of calipers is digital. The beauty of digital is instant readability and the ability to switch scales. Most will display thousandths of an inch, fractions of an inch, and metric. I find fractions pretty useless on calipers, but I often switch to metric to make math easier. The model I recommend to my students is the 6-in. Electronic Digital Caliper from iGaging, a steal at around $25 online.

How to take a measurement

Calipers can make a precise measurement in four ways. Most people know about the first three. At the business end you'll find two pairs of jaws that can grab the outside of a workpiece or the inside of a cavity or hole of some kind. When using these jaws, you have to make sure you are not skewing them and getting a false reading. It helps to take a couple of measurements to be sure.

At the far end of the tool you'll find a probe, which moves when the jaws move and measures the depths of holes and mortises. Here, I make sure the body of the tool is touching the surface squarely and then I plunge the probe. Again, I take a couple of readings to make sure I'm getting an accurate one.

A fourth and lesser-known technique is to use the step between the two jaws, on the back of the tool, to measure the distance from an edge. All types of calipers have it. The probe can do a

Online Extra

For a simple fraction-to-decimal conversion chart that you can hang on your wall, go to **FineWoodworking.com/extras.**

Photos: staff

Perfect dado joints

Whether fitting a dado to plywood or planing a solid shelf to fit, calipers speed up the process.

Check the dado. *Use the inside jaws to find the precise width of any dado. For an accurate reading, lay down the calipers as flat as possible, so the jaws sit squarely in the opening.*

Check your stock. *As you plane down your stock to fit, take measurements to see how close you are.*

Use the magnet trick. *Attach the calipers to your planer with magnets, so you can adjust the bed precisely for the final pass.*

Nailed. *After the final pass on the planer, the shelf fits its dado perfectly.*

similar measurement, but the advantage of the jaw step is that it registers squarely, without wobbling. With the step riding the edge of a workpiece you can also use the caliper as a layout tool, the way you would use a combination square, but with 0.001-in. precision.

There is a lock knob on top of the jaws, which is helpful when you are working to a specific dimension and you don't want the setting on the caliper to change. And the dial (both digital and analog) can also be zeroed out in any jaw position.

Perfect mortises and tenons

When making mortise-and-tenon joints with power tools, calipers are a real star. After the mortises are cut, calipers tell you exactly how big they are. You might think that the mortise will be the same size as your router or mortising bit, but runout in the router or problems with a jig or machine setup could change that dimension. By measuring the actual mortise, you can make tenons to fit.

If you prefer cutting joinery entirely by hand, calipers are just as indispensable, checking that the walls of a mortise are parallel to each other and to the outside of the workpiece. Once you have the mortise true and straight, the calipers will tell you if the tenon is staying even in thickness as you cut, and help you dial in the fit.

Precise machine setups, too

Calipers are also indispensable for machine setups, for example when running stock through the planer until it fits perfectly into a dado. I use the inside calipers to take a measurement of the dado, and then use the outside ones to sneak up on the right thickness.

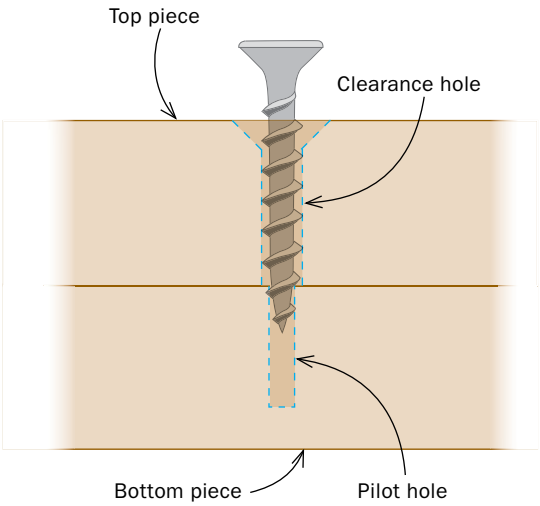
When I get close, I actually stick the calipers onto the planer using a set of standoff magnetic tool holders from Lee Valley. This setup lets me gauge the exact amount I am moving the cutterhead. I just love getting a perfect fit on my second pass, simply by measuring. It saves a bunch of time over guessing.

When going in the other direction—fitting a dado to plywood, for

Drawings: John Tetreault

Better screw joints

If you drill a precise pilot hole in the bottom piece, plus a slightly larger clearance hole in the top piece, you can get surprising strength from a screw. Calipers measure the screw and help you pick the right drill bits.



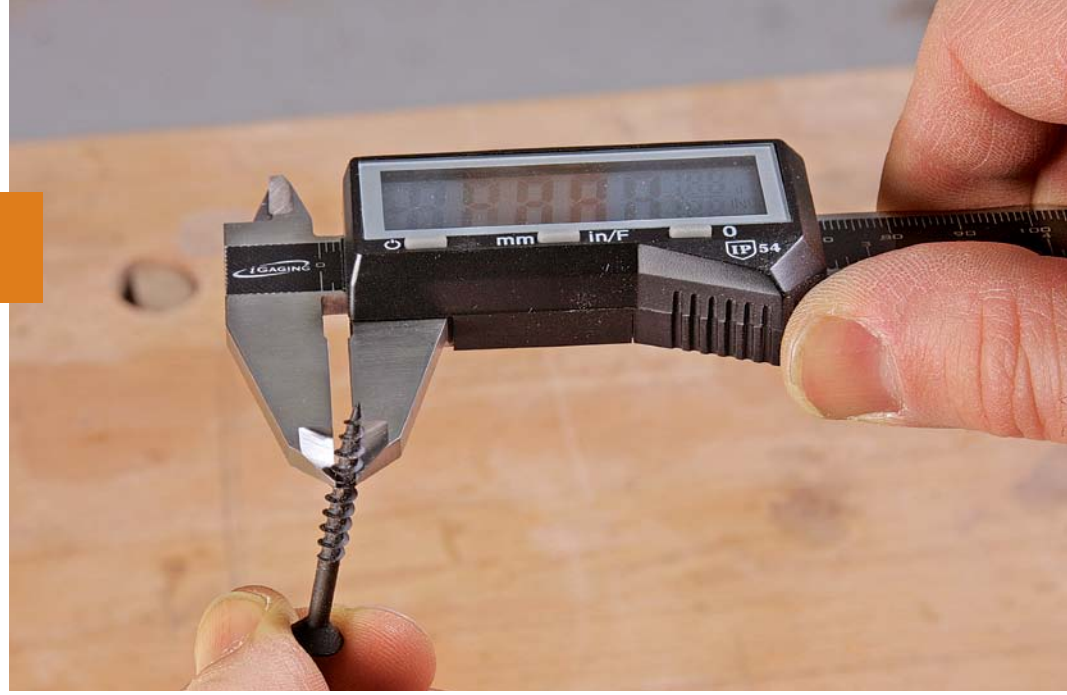
example—I use the calipers to micro-adjust the dado stack for a perfect fit. First I assemble a dado stack that is close, but just under, my shelf size and run a test piece. Then I measure the shelf again, and the dado, and hunt through the shim set with the calipers to find exactly what I need to add to the stack.

Stronger screw connections

Another great task for calipers is sizing the holes for screws. It is very important for the screw to pass freely through the top piece being attached. This is called a clearance hole. The lower piece of wood gets a pilot hole, which is smaller, letting the threads grab the wood firmly without splitting it.

Put simply, calipers are an information-gathering tool, maybe the best one in the shop. And better information leads to better accuracy. □

Timothy Rousseau builds furniture in Appleton, Maine, and teaches at the Center for Furniture Craftsmanship in nearby Rockport.



Pilot and clearance holes. *Use the skinny part of the jaws to reach between the threads and measure the central section, called the root (above). Use the flat part of the jaws to measure the outside of the threads (left).*

Dial in the bits. *Fractional drill sizes can be confusing. Keep it simple by using the decimal scale to pick the right bit.*