

Doweling

The whole secret is absolute accuracy

by James Krenov

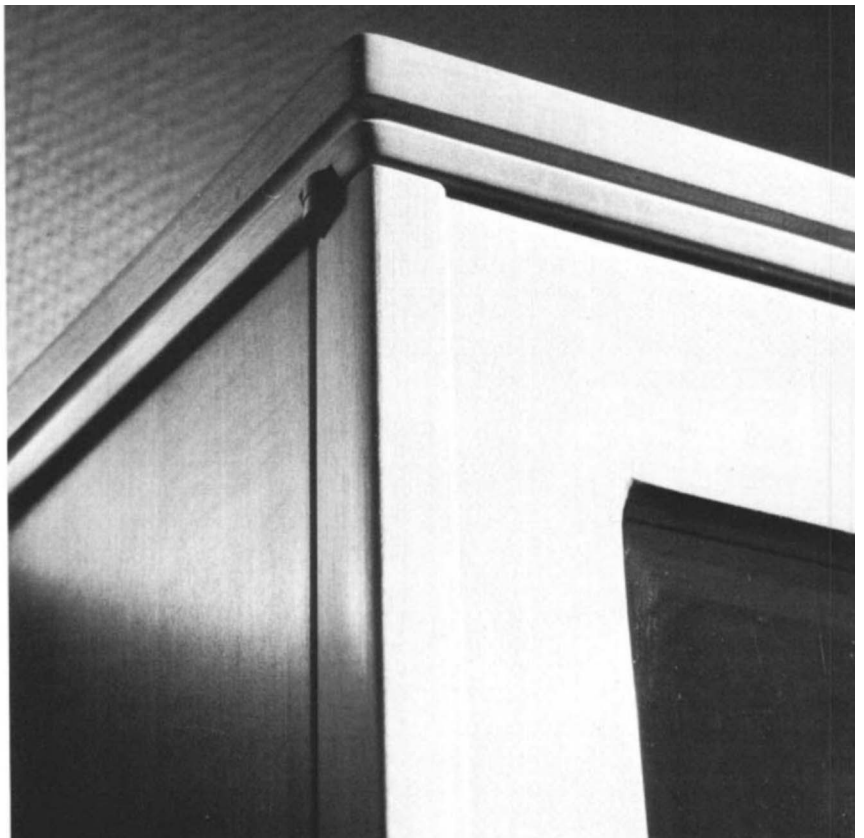
There is a lot of misunderstanding about doweling. While it is a widely used method in industry, rather little is known about it among craftsmen, at least in America; in Europe it is more commonly used. Because doweling is not visible as a joint, some craftsmen tend to be suspicious of it. When we use this technique without proper knowledge we use it badly, with bad results that increase our doubts.

By its nature, doweling is not convincing; the eye does not see how this joint is put together, and there is no pattern there to reassure you that those pieces of wood will stay together. When done right and used in a sensible relationship to the piece, to its character and its aims, doweling is a very good way of putting cabinets and even chairs together. It is primarily a commercial or production way of joining pieces, which I suppose is a part of our prejudice against it.

Maple showcase cabinet is doweled together to permit subtle shaping of overhanging top. Sides of carcase are veneer on solid, with the

The cabinetmaker's use of doweling should always be a matter of judgment. If you are making a seaman's chest that is going to be thrown downstairs or onto a ship, or a solid wood piece where other joints, visible and decorative, would be better, then use other joints. I do not think a seaman's chest should be doweled; it should be dovetailed. But a cabinet case can be doweled, especially if it is going to be a wall cabinet, and it will last for generations. One reason for choosing to dowel is visual, the character of the piece we are making. By doweling the case you can achieve a definite and fine-lined character; you get a visible top and bottom piece that can be made to protrude as you wish beyond the sides to give a horizontal outline at these extremities. You can do all sorts of nice things with these horizontals. You are free to bevel as you wish, to polish the end grain beautifully, to play

thick veneer bandsawn from the same stock as top, bottom and doors, thus stretching a choice piece of wood.



with touches such as little foundings, and achieve the shadings which will emphasize the shape of the piece itself—lending it a very special air. Dovetailing, in contrast, is rather binding, since then the sides will probably be flush with the top and bottom pieces. All too often this results in a naked, stripped-down effect. You can put the carcass together with a false top and bottom on the inside and then add outer pieces, yes, but that is a complicated method and not always desirable. In many cases it is awkward, too, and there is a chance that the outer pieces will warp and crack away from the inner pieces which are dovetailed. And then, of course, the appearance of the cabinet is definitely limited by the fact that the sides are flush with the top and bottom, and there is this pattern of the joints which, however pleasing, is not always appropriate; it lacks elegance in some respects, since it almost always has a rustic air.

Although I myself do not often work with surfaces that are veneered, they should be mentioned here in connection with doweling. On a fine bandsaw like mine it is possible to saw veneer $3/32$ inch thick from solid stock; that is, from a chosen part of *the same wood you will use for the rest of the piece*. This I do on a few occasions, and the resulting veneer is so evenly sawn that I need not even surface it before gluing. The thickness, not over $3/32$ inch, *allows me to work the wood as wood*—which some of the commercial veneers can hardly be called in these days of microthin cuts and the whole almost clinical process of using such veneers. With edge-gluing that allow for pleasant roundings, I have surfaces which are as fine as I want them: they can be polished with a plane, oil-finished or waxed—and they are alive, real wood. Here doweling is most handy as a way of putting carcasses, small boxes and other pieces together. One can again work with fine shadings and proportions—but now, without the end grain being visible, these details are even more subdued and refined—if we so want them in a certain piece.

The whole secret of doweling, and it is somewhat of a secret because of lack of common knowledge, is accuracy. You must be absolutely accurate. Some of us imagine we can make a jig and hold it against the piece to be drilled and then casually drill these holes. We can try, but the result will probably be a disappointment because the torque of the drill itself, and a number of human factors, result in holes that are not as accurate as they should be. A little bit here, a little bit there, and we've lost it; a sixty-fourth and a thirty-second and the whole thing gets out of hand; we have lost the very exactness that is the essence of making this joint. *This is definitely a case where it pays to do everything right, to take the extra time of making the jig, and of doing each step perfectly.* This way, doweling becomes an easy, not unpleasant, and very useful part of our cabinetmaking.

To do this kind of work we need a suitable electric drill and a stable horizontal surface on which to rest our work. This surface needs to be adjustable in relation to the drill or vice versa; we can raise and lower the drill itself, for instance. A fine simple machine for this purpose is the horizontal mortiser—just the basic machine without any special feed adjustments or other finesse. A poor man's version can be set up according to resources and inventiveness: it can consist of anything from a small portable drill mounted on a wooden stand, to a stable motor with a fine chuck and an adjustable test made of metal. Such a set-up takes rather little floor space. It is absolutely essential for doweling. Besides this, it is

a most useful piece of equipment when it comes to making mortises.

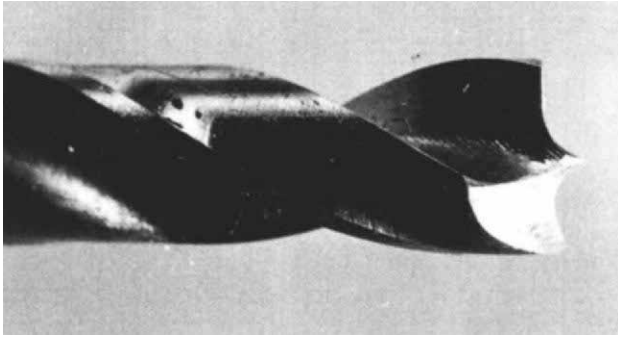
Fine fluted dowels are available in various sizes. However, they are not a hobby item, and are not likely to be found in the store around the corner; most of us are apt to end up with plain, smooth dowel stock in lengths of three feet or so, which is available in woodworker's supply shops and hobby shops. Simply lay the long piece of dowel on your bench, place a rough woodrasp diagonally on the dowel and roll the dowel along the bench with it. This will produce a series of scores which, although they don't hold the glue as well as do flutes, nonetheless increase the holding power of the dowel. Cut the dowels to suitable length.

Now you have to choose a drill that will give you a tight fit, even on end grain. I point out this matter of end grain because a drill which produces a good fit cross-grain tends to make a hole in end grain that is a bit too large. Another point to keep in mind is that though you will have a jig, you still want a drill that really centers and does not drift, causing oval holes and general inaccuracy. What you want is a drill that tends to center itself and cuts very clean even in end grain. There are cabinetmaker's drills available with a lip and a center spur but these come only in limited sizes and often are not very high quality. A simple way to make what we in Europe call a cabinetmaker's drill is to regrind an ordinary straight-shank metal drill. This may sound complicated but it really is not; with a small grindstone in an electric drill you can easily produce drills with a sharp center spur and very sharp, clean-cutting edges. When ground right this type of drill will cut beautiful holes in any kind of grain, producing a perfect result and crisp shavings. Once you have practiced grinding drills this way, and done a few, and achieved the first successful result, you will want to use these kinds of drills more and more on wood. With better and better results. As to sizes: try the dowel and the drill together, and achieve a snug fit in cross-grain as well as end grain. This usually means the drill size will be just under the diameter of the dowel itself, and here again the reground metal drills are an advantage because they are available in a great number of different sizes.

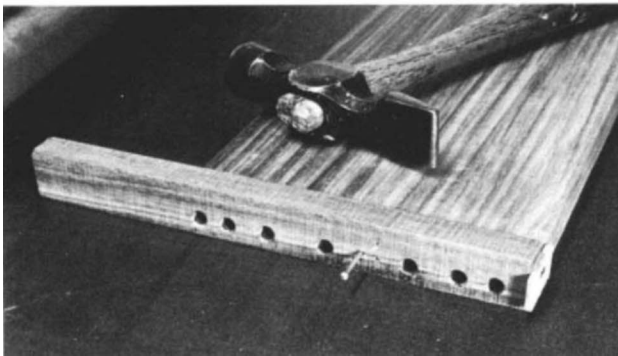
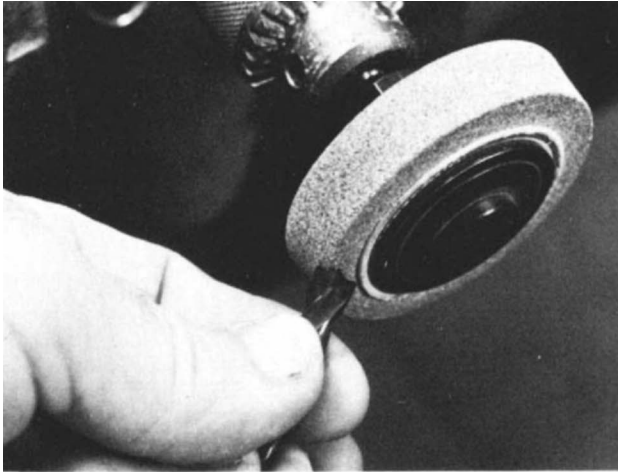
The jig is simply a piece of straight wood squared off and with a plywood or a thin solid wood heel on one end which will correspond to the back side of our cabinet or box or whatever. As an example: if the width of the area we are to dowel together is six inches there will probably be from six to eight dowels. Space these according to your judgment, evenly if you choose, but preferably a bit closer together at the front and back edge, since you do need a bit more holding power there than in the middle of the joint. The short heel at the back should be absolutely square with the rest of the jig. It is well to remember that the holes for dowels should be drilled along the center of the end pieces, and not near the inner or outer edge.

It is an illusion to think that you can hold the jig in place simply by hand as you do the drilling. Therefore, obtain a nice thin brad or perhaps a hardened nail that is used for hanging pictures on walls, and drill a hole in the jig somewhere near the middle area that is a snug fit for the small nail or brad. This is very important, since with a tight fit and the brad driven in properly the jig will not slip.

All the parts you are to drill and assemble should be properly marked. This may sound obvious, yet it is amazing how often we forget to mark the pieces or, when we do mark



Ordinary drill bit is reground, on slightly rounded edge of small stone, to leave sharp center spur and clean-cutting edges.



With heel tight against back edge of board, a single nail holds doweling jig in place for drilling on horizontal mortiser.



them, achieve results that are confusing. We use A, B, C, and 1, 2, 3, and X, Y, Z—all sorts of codes that may or may not work out properly for us, but usually do not. It is a puzzle to me why the classic cabinetmaker's mark of the pyramid or triangle is neglected, because when it is used properly, it is infallible once you get used to it and begin to think in terms of inside-outside, front-back, top-bottom, then this mark is so clear in its message that there is no room for confusion.



The illustration shows how this works. *We determine whether we shall use the inside or the outside of our side-pieces as a point of departure; that is to say whether the most important thing for us is the exact placement of the outside surface or inside surface.* Then we mark the pieces accordingly. We put the piece to be end-drilled on the table of our circular saw or joiner, place the jig against it and drive home the brad—making sure the heel is tight against the back edge. Check and recheck this. Think through the way the piece is going to be put together, the relationship of the jig to the surfaces, and the measurements that are most important, before you fasten the jig! Drive home the brad deep enough to hold, but not all the way; you will be removing it as you change the jig from one end of the piece to another. Drill carefully and steadily, holding the jig (even though it is nailed) firmly with your hand. Drill a little deeper than the length of dowel which is to go into the sides or the end-grain pieces. If you do not drill deep enough, then when you drive the dowel in for keeps the glue will run and make the work messy, so allow a little space at the bottom for excess glue and for the dowel to be able to "breathe" a little. Before you put the dowels into the parts with the end grain (which usually contain a larger part of the length of the dowel than do the cross-grain top and bottom pieces), countersink the holes a little. Then decide how much of your dowel is going to go into cross-grain pieces—the top and the bottom for instance, or the short ends of a box or a case—and allow approximately that much dowel to protrude. You can drive the dowels home with the help of a small block which corresponds to the thickness that you want to allow for, or you can insert the dowel a bit less deep than needed and then saw the protruding ends to an even length with the help of a strip of wood.

Prepare for gluing by getting together all you need: glue, a little piece of thin dowel with which to coax the glue into the holes, pieces of rag, a proper hammer, and a little spacer block to use as a stop when tapping the dowels into place. Work carefully and methodically. Blow out extra shavings or crumbs from the holes, put in enough glue but not too much, be careful in every respect, even to the extent of checking and rechecking that the ends of the pieces into which you have drilled holes are square and true. Glue the dowels properly, and then set these pieces aside.

Now you are going to use the jig on the top and bottom pieces themselves. There is the edge of the jig which you had

turned *down* as you drilled the first holes: this edge is now your line of orientation; you will use it flipped to correspond with "in" or "out" to achieve the exact relationship between top, bottom and sides that you want. Mark the top and bottom pieces carefully, place the jig there with the heel tight against whatever is the back edge, and then clamp it firmly in position. See that your drill is of the right size; use this in a small portable electrical machine or even a hand-drill. *Do not drill without a wooden stop on that part of the drill shank which is beyond the depth that you want.* Check and recheck this! Remember: you want the hole in the cross-grain of the top and bottom piece to obtain the maximum holding power. But if you do not want an accident you don't drill all the way through. So check this wooden stop, which can be a little block of wood that you have drilled and placed on the shank of the drill, or a piece of thick dowel with which you have done the same. Check the depth against the jig itself before you proceed. Drill the holes carefully, holding the drill vertically, so that you really are drilling all the holes straight down neatly without wobbling too much. This whole thing is a matter of accuracy, and of thinking clearly. The tendency is to be too much in a hurry because you are nearing the point where you are going to put the case together and look at it for the first time. But do be patient; think of the consequences of each mistake, and avoid making it.

After drilling and slightly countersinking the holes in the top and bottom comes the proof of the care and accuracy with which you have worked: You should have a good strong fit and be able to tap the piece together without undue violence. When you have it together dry, consider what should be done next: maybe a door that needs to be fitted, or the back piece; also how the interior of the case will be. *Think in terms of several steps; don't take one little detail at a time and then knock the case apart and do a small bit of work on it and put it together and think about the next little step.* Try to go through as much of the process in your mind as possible at one time. I usually take a chip of wood or a piece of paper and jot down the various things that need to be done, such as planing the back of the piece flush all around early so that whatever machining need be done there later, a rabbet or a groove, will be accurate. Consider the overhang of the top

and bottom in relation to the doors or door, the shadings with which you will want to mark various details, the bevels you will make. All these things are Important. And since you are making something that you hope will be graceful and interesting and neat, you do want to do each part of the work at the right time. If there are to be partitions in the box or cabinet, you need to make the grooves for these before you glue the piece together. There will be holes for shelf pegs, or a recess for a latch or hinges. We'll think about how we shall finish the inside of our piece. All these things must be done before it is too late—not just before it becomes impossible but before doing them becomes more difficult than it should be. That way you are apt to make mistakes and produce a piece not as neat and clean and appealing as you hoped it would be. We want all the time to work towards success, towards achieving the result we strived for, really, and not to have to say: "I was in too much of a hurry to glue the piece together, and I forgot to do this or that; I had to do it later, and it didn't turn out so well because I just couldn't get in there to do it right..." The time we take to think and rethink is time saved, not lost. Once we get into this habit we develop a step-by-step logic which we use without any strain and this adds to the ease and enjoyment with which we work.

This article is taken from *The Fine Art of Cabinetmaking* by James Krenov, published this spring by Van Nostrand Reinhold. It is about woods, tools, techniques and attitudes, a sequel to his *A Cabinet-maker's Notebook (Fine Woodworking, Fall '76)*. It's about what Krenov calls "working well," responding to the nuances of the wood, making refined, harmonious little cabinets. To work as well as Krenov is neither easy nor practical. But he strikes a romantic chord in many, and a few will have the fortitude to make fine cabinetry their own life's work. His plea is that such people be understood and appreciated, and encouraged to carry on.

I met Krenov when I was a student at Rochester Institute of Technology and he came one day to speak to us. I took notes, but one comment I did not write down. It hit home and I'll never forget it. He was talking of how students often apologize for their work, "You know, I made this drawer...it's not quite right, I goofed over here...next time I'll take more care." He paused, this wiry little gnome of a man, and said, "That's all very well and human, but when will you stop having to apologize, and start doing the very best you can? When will you begin?" —J.K.

With the holes slightly countersunk for glue squeeze, dowels are tapped home. Block

gauges depth. Same jig is used to drill cabinet top, which has not yet been

trimmed to length. Wooden stop on bit prevents catastrophe. A good fit.

