

Figure 7-13. When a bit exits a hole, you may get some tear-out, as shown on the right. To avoid this, drill partially through the board until just the pilot of the bit comes out the other side, as shown in the center. Then turn the workpiece over and drill from the other side. The hole will be clean, as shown on the left.

wood slowly and evenly (Figure 7-12). Don't force the bit; just maintain a light, steady pressure. When drilling deep holes, it is necessary to retract the bit now and then to clear chips from the hole.

When you feel the depth control stop the quill, retract the bit. Turn off the machine, let it come to a stop; then remove the workpiece.

Avoiding Tear-out-Tear-out, the rough, splintery edges where the bit exits the workpiece, can be avoided by moving the scrap block every time you drill a new hole, so there's always a flat, firm surface to back up the workpiece. Or, if you're using brad-point bits, you can use the depth control to avoid tear-out.

With the Mark V turned off, extend the quill until the pilot of the bit touches the scrap board. Set the depth control to "0" and lock it in place. Let the quill retract.

Drill the holes you need, letting the depth control stop the quill. Turn off the Mark V and turn the workpiece over. There will be tiny pinholes where the pilot started to come through the workpiece (Figure 7-13). Use these pinholes to line up the bit; then finish drilling the hole from the other side. Since brad-point bits have spurs that cut the wood grain smoothly when they enter the wood, there will be no tear-out on either side of the workpiece.

Drilling Partway

To drill a hole only partway through a workpiece, extend the quill until the cutting flutes of the bit just touch the workpiece (Figure 7-14). Set the depth control at the desired depth and lock it in place; then drill the holes you need.

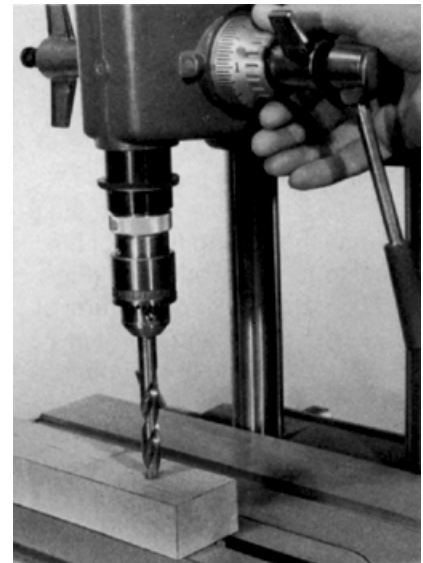


Figure 7-14. Extend the quill until the cutting flutes of the bit just touch the workpiece.

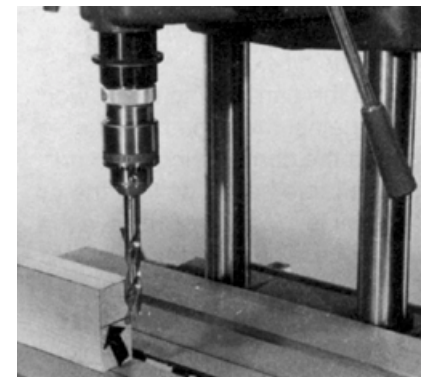


Figure 7-15. Extend and lock the quill so the point of the bit lines up with the mark you've made on the work.

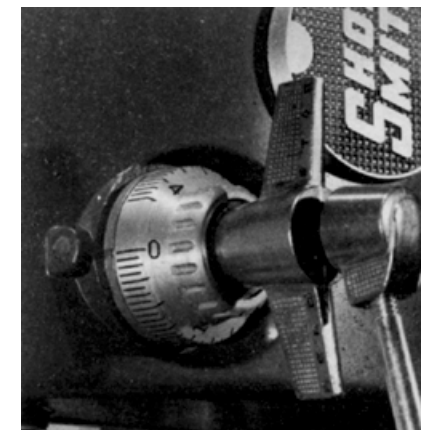


Figure 7-16. Then turn and lock the depth control at "0". The quill will extend only the distance you have determined.

The depth control will stop the quill when the bit reaches the proper depth in the stock. All the holes you drill at any one depth control setting will be exactly the same depth.

Another way of drilling partway is to mark the work to indicate the necessary hole depth. Extend and lock the quill so the point of the bit lines up with the mark on the work (Figure 7-15). With the quill held in the extended position, rotate and lock the depth control at "0" (Figure 7-16). Unlock the quill and proceed with the drilling.

Drilling Screw Holes

If screws are to drive easily and hold with maximum strength, the screw holes must be drilled carefully and to size (Table 7-2). Usually two holes are needed: the shank hole, which equals the screw diameter, and a smaller pilot hole, which allows the screw end to penetrate the wood (Figure 7-17).

The easiest procedure is to drill the shank hole first. This establishes a guide and a center for the pilot hole. Countersinking, which can be controlled by using the depth control, is done on the surface to establish a seat for the head of the screw when it must be flush with the surface of the work (Figure 7-18). In softwoods or when the head of the screw is small enough, countersinking may be eliminated since

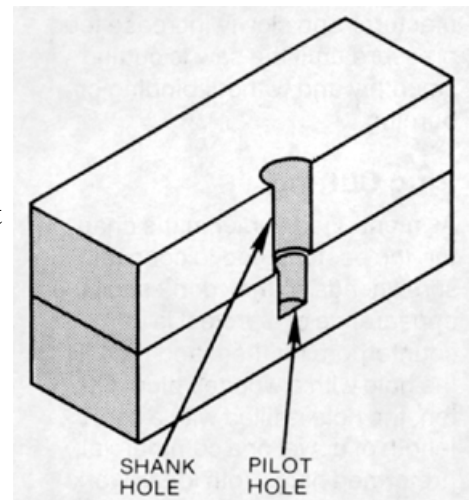


Figure 7-17. A screw usually requires a shank hole for the shank and a pilot hole for the thread. The shank hole should equal the gauge of the screw and go through the first piece. The pilot hole should be half the length of the threaded portion of the screw.

Table 7-2: Drill Bit Sizes for Screws

Screw Gauge #	Shank Hole	Pilot Hole	Pilot Hole
	(Hardwood & Softwood)	(Softwood)	(Hardwood)
0	1/16	1/64	1/32
1	5/64	1/32	1/32
2	3/32	1/32	3/64
3	7/64	3/64	1/16
4	7/64	3/64	1/16
5	1/8	1/16	5/64
6	9/64	1/16	5/64
7	5/32	1/16	3/32
8	11/64	5/64	3/32
9	3/16	5/64	7/64
10	3/16	3/32	7/64
11	13/64	3/32	1/8
12	7/32	7/64	1/8
14	1/4	7/64	9/64
16	17/64	9/64	5/32
18	19/64	9/64	3/16
20	21/64	11/64	13/64

the screwhead will form its own seat as it is turned into the wood.

Screw and bolt holes can be counterbored when it is desirable for the fastener head to be set beneath the surface of the wood.

Counterbored holes are often sealed with plugs cut from the same type of wood. These may be set flush with the surface of the work and glued in place so the grains match, or they can protrude slightly to provide a decorative touch. This is seen quite often on Early American furniture.

Special bits, like the screw bit shown in Figure 7-19, let you drill accurate screw holes with minimum fuss. They are actually bits that form tapered holes and have sleeve-type, adjustable counter-sinks and collars so you can control hole depth and countersink diameter.

Drilling Holes Through Extra-Thick Stock

Because a spindle extension has a limit and bits should not be buried in the work more than the length of the bit's flutes, it isn't possible to drill through extra-thick stock in normal fashion. You must drill from both sides of the stock. The problem is that it is difficult to drill both holes on the same centerline; the solution is to use a guide that correctly positions the work after the first hole is drilled.

One method is shown in Figure 7-20. After the first hole is drilled in the work, clamp a piece of scrap to the table and drill through it. Insert a hole-sized piece of dowel in the scrap piece, replace the work so the first hole drilled will be over the dowel, and finish drilling.

Another method calls for a special insert (Figure 7-21A), one you can retain for future, similar operations. The drilling procedure is the same. Drill the hole as deeply as you can, or a little more than halfway through the stock. Then position the work by placing it over the pin in the insert and finish drilling (Figure 7-21B).

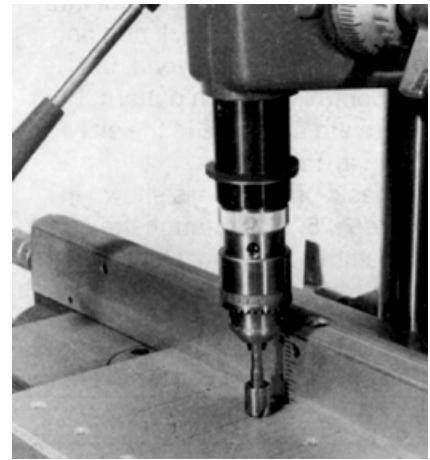


Figure 7-18. A special tool called a countersink forms the inverted cone that allows countersunk screws to seat flush with work surfaces. Use the depth control to obtain identical countersinks.

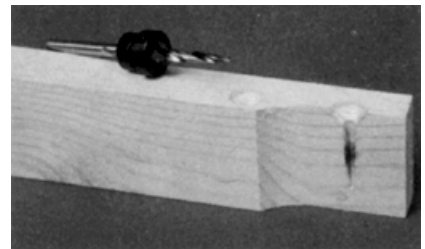


Figure 7-19. Screw bits control hole depth and countersink diameter.

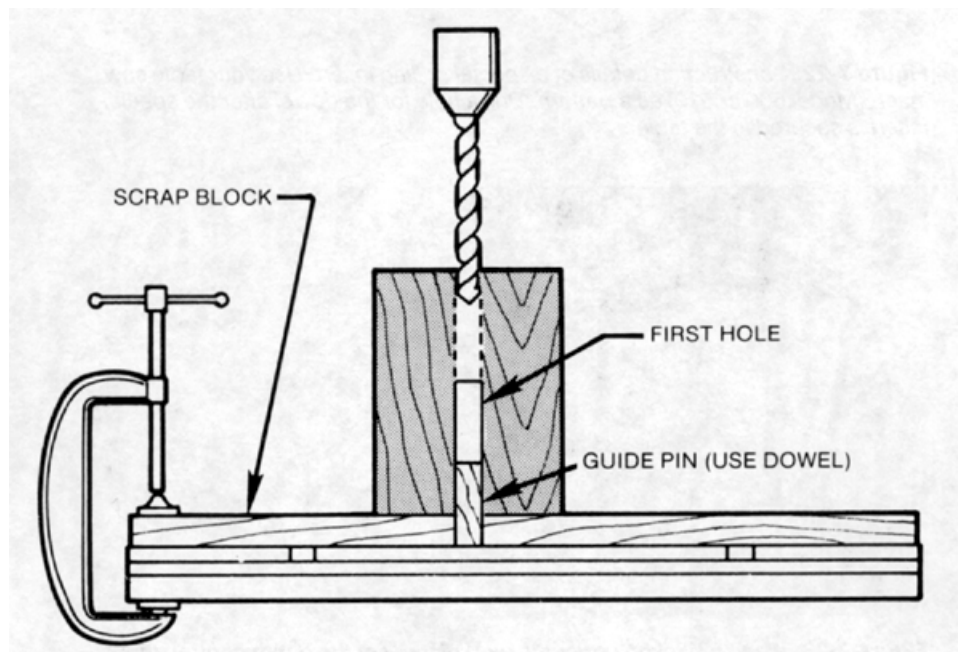


Figure 7-20. This is one way to drill from both ends of extra-thick stock. The work, positioned over the guide pin, is accurately placed for the second hole.