



TOOL TEST

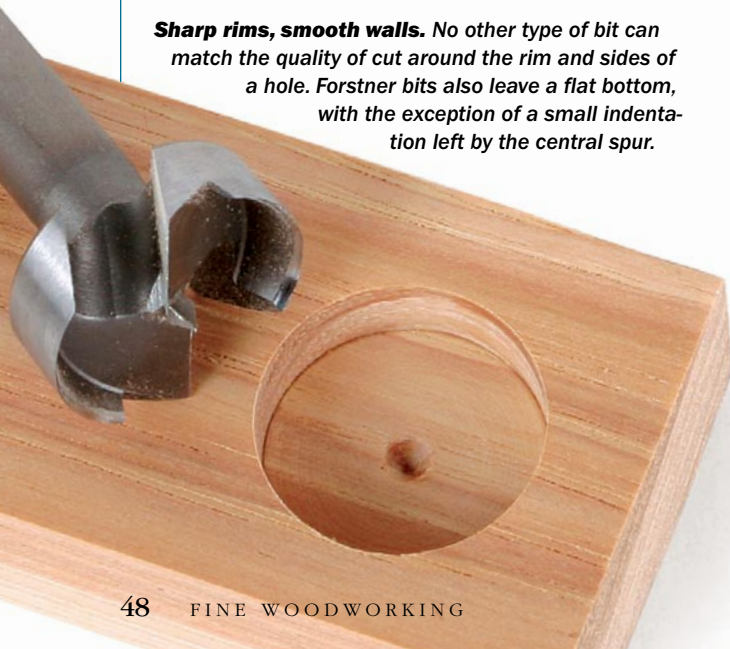
Forstner Bits

For unmatched quality and precision in your drilling, you can't beat these bits. We look at 18 brands to see which are best

BY ROLAND JOHNSON

THREE GOOD REASONS TO USE THEM

Sharp rims, smooth walls. No other type of bit can match the quality of cut around the rim and sides of a hole. Forstner bits also leave a flat bottom, with the exception of a small indentation left by the central spur.



Drilling at an angle. The sharp rim makes it easy to start the bit in a steeply angled workpiece, as when cutting pocket holes in a table apron.



Overlapping holes. Again, the rim design allows you to drill clean overlapping holes, as when excavating a mortise.

Few woodworking tasks are as frustrating as trying to bore the perfect hole—accurately sized, accurately located, and with a cleanly cut rim. Standard woodworking twist bits, originally designed to cut metal, often leave ragged, inaccurate rims, are difficult to place accurately, and can wander off course resulting in uneven holes. Brad-point bits are better, creating accurate, clean holes, but they don't make it easy to bore overlapping holes or enter the wood at a sharp angle.

The best design for boring high-quality holes is a Forstner bit. Since it was patented by Benjamin Forstner in 1874, this bit has been helping woodworkers cut clean holes with precision (see photos, facing page). Today, Forstner bits come in a variety of designs. To find out which ones are best, I tested 18 brands. The top nine bits are listed on the following pages; the rest are shown on FineWoodworking.com.

How the Forstner bit has changed over the years

The original Forstner bit did not have a center spur and was guided solely by the rim. The design left a clean-sided, flat-bottomed hole, but the bit was hard to position. Most of today's Forstner bits have a center spur and a partial rim. The center spur positions the bit precisely on the workpiece but leaves a small dimple in the center of the hole. In a stand-alone hole, the spur makes the initial contact with the wood, but in other cases the rim alone can be in contact with the wood, guiding the bit.

Testing for accuracy, design, and endurance

I tested 1/2-in.-dia. and 1-in.-dia. bits. The former represent typical smaller bits used for drilling mortises and pocket holes, while the latter allowed us to test the toothed rims that most manufacturers use for larger bits.

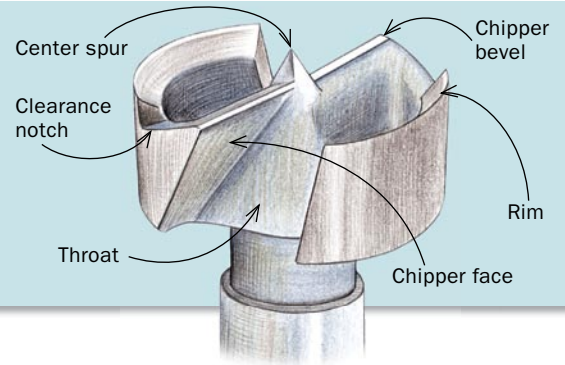
I measured the diameter of each bit to see how close it was to the specified size, and then I measured the diameter of the hole itself. Most of the holes were less than 0.005 in. larger than their respective bit, an acceptable amount.

The next series of tests was to see how the 1/2-in. bit cut overlapping holes and holes drilled at an angle. As I mentioned already, bits with the largest rim did best at this test, while those with little or no rim and only outside spurs were at a disadvantage.

Bits choked with chips don't cut well—With smaller Forstner bits, the proper procedure is to lift the bit out of the cut during deep boring to evacuate the chips. If this isn't done, chips may become compacted behind the bit, locking the bit in the hole and making it difficult to extract. If the chips plug in the bit, you must stop the drill and clear the

ANATOMY OF A FORSTNER

Although types vary, the cutting action is similar: The spur touches down, the rim keeps the bit on track, and the chippers create a flat bottom.



A GOOD BIT OF VARIETY



CARBIDE VS. DIFFERENT STEELS

The majority of Forstner bits are steel, which usually starts out sharper than carbide but has a shorter edge life. Other choices include titanium-coated steel, designed to increase durability, or stainless steel, ideal for working with green wood, treated material, or any other high-moisture applications that would pose rust problems for standard steel bits.



RIM STYLES VARY

Longer rims provide better guidance but tend to overheat. On this high-carbon-steel bit (far left), heating may have removed the temper. To overcome heat, many manufacturers give 1-in.-dia. and larger bits toothed rims. Others, particularly on smaller bits, use cutting spurs only. While fine on stand-alone, horizontal cuts, spurs can't cut overlapping or angled holes with the same finesse as bits with extensive rims.

CENTER SPUR OR FLAT BOTTOM?

All of the bits in the review are good at boring flat-bottomed holes with small dimples created by the spur. MLCS uses a screw for its spur, which can be slid back into the bit to leave only a slight bump in the bottom of the hole.





HOW WE TESTED

Exactly the diameter claimed? The actual diameter of every bit was measured (above) and the discrepancy with the stated diameter recorded. Most holes were slightly larger than the bit that drilled them, indicating slight runout (right).



Plugged up. Many of the 1/2-in.-dia. bits became badly plugged when the head went below the wood's surface. Johnson uses a pencil to eject the plug.



Friction causes heat. While cutting 100 holes in hickory, the temperature of each bit was recorded 10 times using a digital infrared thermometer. Bits that cut cleanly generated less heat.



9 bits made the cut

After all the tests were done, seven steel bits stood out. Also shown are the best carbide bit (Freud), and one with a retractable tip (MLCS).



BRAND		BOSCH	FAMAG
SUPPLY SOURCE		www.amazon.com	www.traditionalwoodworker.com; www.woodcraft.com
STREET PRICE	1/2 in.	\$60 set of 7	\$12
	1 in.		\$16
BIT DIAMETER IN.	1/2 in.	.498	.500
	1 in.	.996	1.005
HOLE DIAMETER IN.	1/2 in.	.505	.500
	1 in.	1.001	1.006
CHIP CLEARING	1/2 in.	Clears	Clears
	1 in.	Clears	Clears
AVERAGE TEMPERATURE °F		181	150
QUALITY OF BORE RIM	1/2 in.	Very good	Excellent
	1 in.	Very good	Excellent
OVERLAPPING HOLE ABILITY	1/2 in.	Excellent	Excellent
	1 in.	Excellent	Excellent
ANGLED HOLE ABILITY		Very good	Excellent

blockage, a time-consuming and annoying task. Plain and simple, a plugged bit won't cut well and may increase friction and burning.

Several of the 1/2-in. bits got plugged as soon as the rim was fully enclosed in the bore. The large bits had an easier time evacuating chips because they have larger gullets between the chipper, or cutter, and the back edge of the rim.

These bits can take the heat—To test their longevity, I mounted each 1-in.-dia. bit in a drill press. I chose the larger bits for this test because there is a greater area in contact with the wood, and therefore more friction. I set the speed to 480 rpm and drilled 100 holes 1 in. deep in hickory, a wood known for its ability to dull a sharp cutter. I used a digital infrared thermometer to check each bit's temperature every 10 bores. An increase in temperature could



STEEL BITS					CARBIDE BITS	
FISCH	FREUD	GRIZZLY	PORTER-CABLE	WOODCRAFT	FREUD	MLCS
www.amazon.com	www.amazon.com	www.grizzly.com	www.amazon.com	www.woodcraft.com	www.amazon.com	www.mlcswoodworking.com
\$7.50	\$45 set of 7	\$30 set of 16	\$40 set of 12	\$4.50	\$12	\$60 set of 7
\$14				\$6.50	\$17.50	
.499	.500	.500	.501	.501	.502	.617*
1.001	1.000	1.002	1.002	1.003	1.009	.996
.507	.506	.500	.503	.506	.502	.622
1.003	1.004	1.003	1.002	1.003	1.009	1.000
Plugs	Minor plugging	Clears	Clears	Clears	Clears	Plugs
Clears	Clears	Clears	Clears	Clears	Clears	Plugs**
165	161	174	177	134	184	186
Very good	Very good	Very good	Excellent	Very good	Very good	Very good
Excellent	Very good	Good	Very good	Very good	Good	Very good
Very good	Very good	Very good	Very good	Very good	Very good	Good
Excellent	Very good	Very good	Very good	Very good	Good	Good
Very good	Excellent	Excellent	Very good	Very good	Good	Good

*5/8-in. bit smallest size in set

**if more than 3/4 in. deep

signal a dulling cutting edge. While the average temperature ranged from 134°F to 268°F, none of the bits showed any significant elevation in temperature or deterioration in hole quality toward the end of the borings, indicating that they were still cutting as well (or as poorly) as at the start. In general, bits that made cleaner cuts generated less heat.

The best buy and the best bet

I chose Famag bits, sold by Traditional Woodworker and Woodcraft, as the best overall. They have the longest rims but tight machining tolerances. As a result they cut accurately, run cool, and are easy to operate.

Online Extra

To see how the other nine brands of Forstner bits performed, go to FineWoodworking.com/extras.

Grizzly gets the nod for best value. These bits did a fine job of boring, cleared chips well, and stayed at moderate temperatures. At less than \$2 apiece for a set of 16, they are a great value.

The chart lists five other brands of steel bits that were a cut above the rest, as well as the best carbide bits. I didn't find an advantage with carbide over steel in my limited endurance test, but carbide should hold an edge longer, so a production shop might want to go with the Freud carbide bits. If a truly flat-bottomed hole is the deciding factor, the MLCS bits with the removable center spur are the ones to buy. □

Roland Johnson is a contributing editor.