



Drilling Concrete?

Get a Rotary Hammer

Here's a look at six tools that bore holes up to 1 in. but also chip concrete and even bore large holes in wood

BY DAVID CROSBY

Concrete is a versatile but unforgiving material. The same qualities that make it so useful also make concrete tough to work after it has cured. The most common way that builders, remodelers, and carpenters encounter cured concrete is when they need to put holes into it, such as for anchor bolts, pins, dowels, and plumbing or electrical chases.

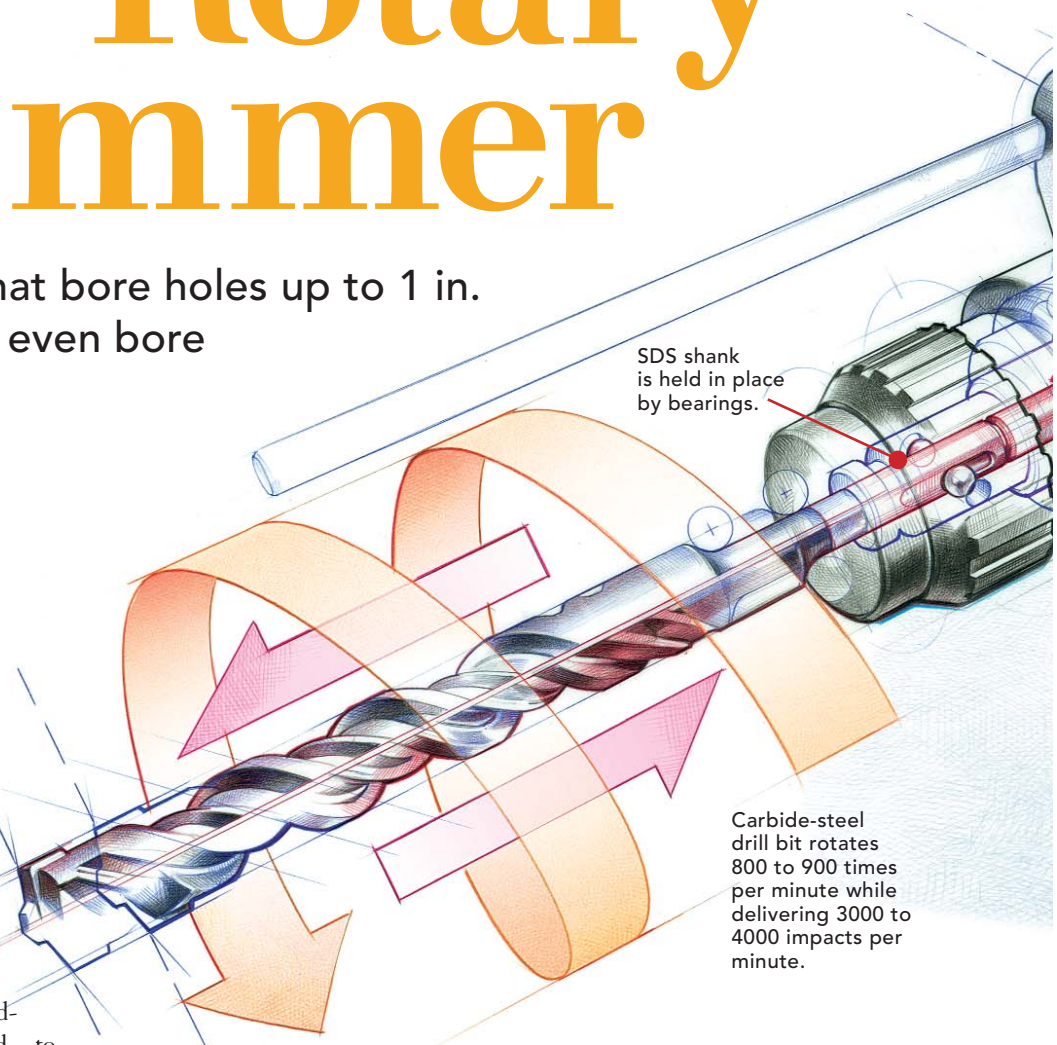
You could make holes the old-fashioned way, with a hammer and a star drill—a piece of hardened-steel that's struck, then rotated, struck, then rotated—to get a hole, eventually. Or you could use a hammer drill (sidebar facing page) for a few small holes. But for quickly drilling a lot of holes in concrete or in a masonry wall, nothing beats a rotary hammer.

Look out, though: With competition fierce and manufacturers making a broad range of rotary hammers to fill subtle niches, the number of choices available can be overwhelming. To make a first pass at limiting your search, ask yourself what size holes you intend to drill.

Start by choosing the right-size tool for the job

Rotary hammers fall into two general size classes: The smaller ones accept bits with SDS or SDS-plus shanks, and the larger hammers use either SDS-max (looks similar to a larger SDS bit) or spline drive (looks like the spline on a drive shaft or truck axle). Within these classes, the tools are categorized by their nominal drilling capacity, or the largest hole that the tool is designed to drill efficiently.

Even though rotary hammers are available with drilling capacities from $\frac{3}{4}$ in. to 2 in., 85% of all holes drilled in residential construction



are $\frac{3}{4}$ in. or smaller. This is a good point of departure for narrowing the field, but there's more to the story.

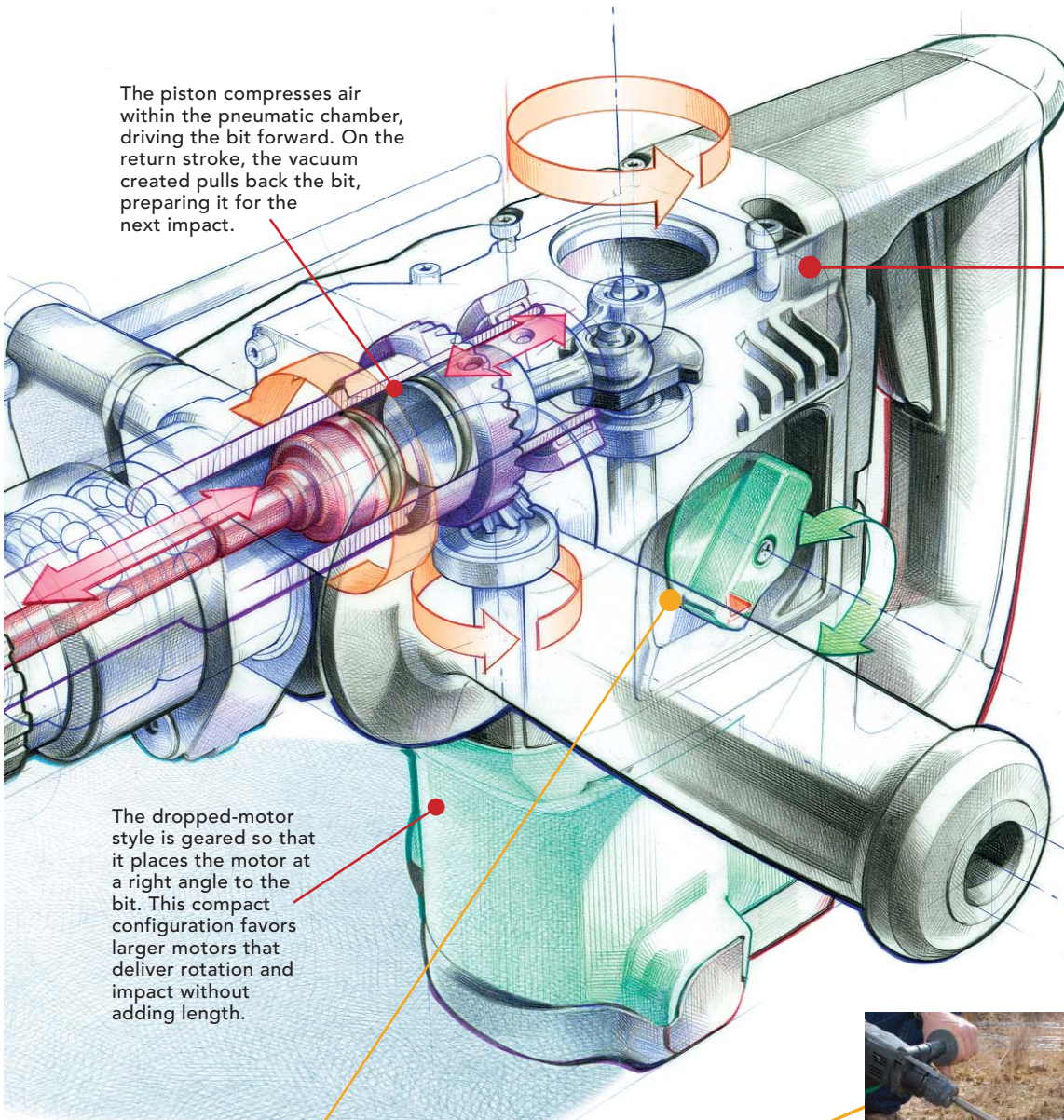
Constantly operating a power tool at full capacity may fall within the manufacturer's specifications, but over the long haul, you, the tool, or both may suffer early burnout. A little extra power goes a long way toward improving comfort, ease of use, and productivity.

Of course, too much of a good thing shows up as extra size, weight, and cost. The happy medium for most residential work falls within the 1-in. to $1\frac{1}{4}$ -in. range of drilling capacities. These rotary hammers, at the upper end of the SDS category, drive $\frac{3}{4}$ -in. bits smoothly without working too hard. All the hole-drilling tests for this review were done with $\frac{3}{4}$ -in. bits.

Don't underestimate their versatility

Even though the 1-in. to $1\frac{1}{4}$ -in. rotary hammers generally are used for boring concrete, they also have rotary-only (drilling) and hammer-

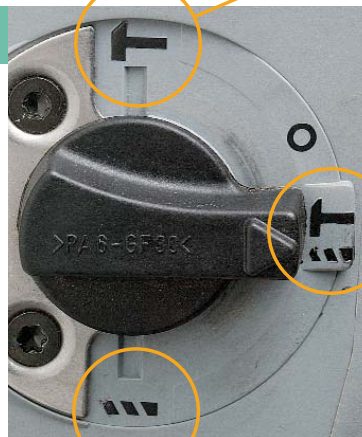
The piston compresses air within the pneumatic chamber, driving the bit forward. On the return stroke, the vacuum created pulls back the bit, preparing it for the next impact.



The dropped-motor style is geared so that it places the motor at a right angle to the bit. This compact configuration favors larger motors that deliver rotation and impact without adding length.

Three tools in one

Rotary hammers typically operate in three modes: **hammer only** (chipping), **rotary/hammer**, and **rotary only** (drilling). Tools in the 1-in. to 1½-in. range are well suited for residential work not just because they bore holes in concrete quickly, but when chipping concrete, they're powerful enough to be useful. In drilling mode, these tools bore large holes in wood easily.



HOW DOES IT WORK ?

Old-timers made holes in concrete with a star drill, a piece of hardened steel with a star-shaped chisel on the end, that was struck with a big hammer, rotated an eighth of a turn, then struck again. Eventually, you would get a hole.

With a rotary hammer, the bit pounds and turns at the same time, but the similarity ends there. There is no hammer delivering the impact. Instead, a gear-driven crank moves a piston back and forth within the pneumatic chamber. The compressed air created by this motion propels the carbide-steel bit forward, delivering concrete-pulverizing impact. Drilling into 3000-psi concrete, this engineering marvel bores ¾-in. holes, 4 in. deep, in about 30 seconds.

HAMMER DRILLS ARE DIFFERENT

Hammer drills, which are lighter than rotary hammers, tap away material with a percussive mechanism like two poker chips rubbing together. If you push harder (within reason) on a hammer drill, you bore faster. The opposite is true of rotary hammers. Their bits actually move back and forth, or reciprocate, with each blow. If you lean in to a rotary hammer, you only slow it down and wear it out sooner. Just hold it securely and let it do the work.

only functions. What sets this class apart is that unlike smaller rotary hammers, the hammer-only function on the 1-in. to 1½-in. models is powerful enough to be useful. This size is great for light demolition, removing tile, brick, block, and small amounts of concrete, especially in tight spaces. In drilling mode, these rotary hammers also can be used to bore large holes in wood.

Contributing to the extra power and compact size is the squarish dropped-motor style common to all the tools, except the Metabo. Orienting the motor in this way puts it at a right angle to the bit, allowing for the tools to be designed with larger motors but without added length. That said, these rotary hammers remain light enough to han-

dle; each hammer weighs in at less than 11 lb. None of these tools is prohibitively expensive.

Each of the rotary hammers features variable speed, but the size and placement of other controls vary by manufacturer. Using these tools is hard work, and I'm in favor of any design that makes it easier to adjust the controls or to change bits with a gloved hand.

The six hammers that I tested each came with a depth stop and a case. Some of the cases stored bits and accessories better than others. While this may seem like nit-picking, remember that a rotary hammer is likely to be one of the more expensive power tools on the job. Bits and accessories easily can equal the cost of the tool. At the end of



To be objective, I built a rotary-hammer drill press. Each tool was outfitted with a new ¾-in. carbide-masonry bit prior to drilling five consecutive 4-in.-deep holes (gauged with a stop block). The times for each drill were recorded, then averaged, and are noted in the comments for each tool. Surprisingly, all the tools drilled faster in the drilling jig than they did handheld.



Bosch 11236VS

A first-rate machine, the Bosch (877-267-2499; www.boschtools.com) is well suited for professional use. I found no problems with it in any regard. The case is by far the best. It permits easy, well-organized storage for tools and bits. The depth stop is well made, and chisels can be rotated to 36 different positions. The controls are easy to access, and the overall quality is good. It isn't as powerful as the Makita or the Hitachi, but the Bosch is a good buy for the money.

Capacity -----1½ in.
 Weight -----9.3 lb.
 Drilling test (sec.) --32
 Cost -----\$300

Once you've drilled the holes...
Concrete anchors

Lead shields and lag screws are commonly used to anchor lumber to masonry.

Fastener photos: Courtesy of Concrete Fastener Systems Inc.; 888-498-5747; www.confast.com



Tapcon screws, made from epoxy-coated, hardened steel, thread directly into concrete. They're easy to remove and replace. Lead shields aren't necessary.



a cold, muddy day, cleanup and bit storage have to be easy. If it's hard to stay organized, chances are you won't.

Narrowing the field by cost

Features are important, but a purchase comes down to this: How much tool can I get for my money? Many power tools used to build houses can be reliably (if artificially) divided into three groups: less than \$200, less than \$400, and less than \$900. As a professional builder doing residential work, I wouldn't spend \$900 for a drill. But I'd definitely spend \$200, and if I could get a tool that would do a lot more work for around \$400, I'd seriously consider it.

I tried to limit the field of 1-in. to 1¼-in. rotary hammers to less than \$400. This size offers enough power to perform residential tasks well at a price that's not prohibitive. The price range worked—until I considered tools by Makita and Hilti. In the case of Makita, I included the company's comparable rotary hammer, the slightly heavier HR3000C, because it wasn't far out of the price range (around \$500). But at about \$625, Hilti's TE 15-C DLX seemed like too much of a stretch, so I didn't include it.

Putting the rotary hammers to work

To get a better picture of how well these tools perform, it was important to note their day-to-day performance as well as to create a



DeWalt D25304K

The DeWalt (800-433-9258; www.dewalt.com) is light (6.8 lb.), but with rotary hammers, light weight is not always an advantage. Its compact length (11.5 in.) is definitely an advantage in tight places. The D25304K was loud and appeared to labor as it drilled in the hole-boring test. It was easy to drill too deep with the plastic depth stop.

Capacity -----1 in.
Weight -----6.8 lb.
Drilling test -----36
Cost -----\$350



Includes a quick-change removable SDS chuck and a 1/2-in. three-jaw chuck.



Hitachi DH30PC

This tool (800-829-4752; www.hitachi.com/powertools) is a fine machine, a smooth and powerful performer, second only to the Makita. It's compact in size and has the best handle and depth stop in the group. Vibration and noise were minimal when drilling holes or during light chipping. The Hitachi comes with a dust collector for overhead drilling. My only complaints are that the switch for selecting modes of operation is undersize for gloved hands, and the case is so small as to be troublesome.

Capacity -----1¼ in.
Weight -----10.6 lb.
Drilling test -----26
Cost -----\$369



Wedge anchors are medium-to heavy-duty anchors. The material being fastened can be used as a template for the hole being drilled; both holes are the same size.



Strike anchors, similar to wedge anchors, are set easily by hammering a steel pin, which spreads the anchor's flanges. They are difficult to remove.



more objective hands-off drilling test. The way a tool feels in your hands is subjective, but anyone familiar with power tools knows that often the feel of a tool is a reliable indicator of quality. Better tools look solid, feel solid, and operate powerfully and smoothly. And when it comes to rotary hammers, lower vibration translates to less user fatigue.

I studied the owner's manuals, then spent some time drilling lots of 3/8-in. holes and chipping chunks off a large block of 3000-psi concrete, batched with highly consistent 3/8-in. or smaller aggregate (the kind used for filling insulated concrete forms).

In addition, I did some drilling using a homemade drill press (sidebar p. 74), partly to hold the drills in a constant vertical orientation

and partly to remove operator inconsistency. Even though all the tools are rated at about 7.5 amps (again, the Makita was rated slightly higher at 8.2 amps), differences were apparent immediately.

Drill fixture yields surprise

When using a rotary hammer, a firm, steady, stable grip is important for several reasons. Foremost is safety: If one of these hammers gets away from you, it could be painful. Second, if you don't hold the rotary hammer still, relative to the workpiece, you will end up with an odd-size hole. This may seriously weaken the holding power of an expansion anchor. Third, a firm grip results in greater efficiency. Even

SDS BITS ARE FOR MORE THAN DRILLING HOLES IN CONCRETE

Drill bit

Chisel

Point

Core bit

Wood chisel

Rotary hammers excel at boring concrete, but their drilling/reciprocating action can be put to work in other ways. For light concrete demo, chisels or points are useful. Core bits are available for drilling holes in concrete up to 3 in. in dia., and for amazingly fast rough-wood chiseling, Bosch offers a set of wood chisels.



SDS shank



Bits courtesy of Bosch Power Tools

Makita HR3000C

The Makita (800-462-5482; www.makita.com) is my favorite rotary hammer in the group. Its heavier weight and slightly larger capacity proved to be advantages. The controls are easy for gloved hands to use, and the variable-speed switch is accurate, steady, and predictable. This tool features a clutch, which disengages the motor from the output shaft in case the bit binds during drilling. The long cord with strain relief and the easy-to-use chuck for speedy bit changing are great user-friendly features. The generously sized case could be designed more efficiently.

Capacity -----1 1/2 in.
Weight -----10.1 lb.
Drilling test (sec.) --18
Cost -----\$500

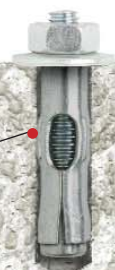


Concrete anchors *Continued*

Drop-in anchors lie flush to the surface of the concrete. Machine screws thread into them.



Sleeve anchors, similar to wedge anchors, are light- to medium-duty fasteners.



knowing this, I was surprised by how much faster these tools worked in the drilling rig I made.

Earlier, when doing handheld drilling using the rotary hammers' depth stops, the tools averaged from 35 to 45 seconds to drill a 3/4-in. hole, 4 in. deep. After clamping the tools into the drill fixture, the drilling times were cut nearly in half, with nothing more than gravity and the 6 lb. or so from the steel sleeve aligning the hammer with the jig.

Drilling, both handheld and with the drill fixture, was done on the same chunk of concrete. My hunch is that handheld drilling was slower due to too much pressure from the user, which lowered the tool's efficiency, or due to unintended lateral movement, or a combination thereof.

Two rotary hammers stood out

If I had to stay within my \$400 limit, I'd choose the Hitachi. It has the best depth stop and side handle; I also think it's the best tool for the money. Overall, though, my favorite is the Makita HR3000C. It's well designed and smooth-drilling, and it's in a class by itself when it comes to drilling speed. But at around \$500, the Makita is in a higher price class, too. □

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Metabo UHE 28Multi

The Metabo (800-638-2264; www.metabousa.com) is a light, well-balanced, finely crafted tool. It has a "smart" switch, which prevents the tool from restarting if power is temporarily interrupted while the switch is locked on. It was pleasant to use and quiet, and it had relatively low vibration. Even though the Metabo had no apparent deficiencies, it did not deliver performance equal to the other tools in the group.

Capacity -----1 1/2 in.
 Weight -----6.2 lb.
 Drilling test -----37
 Cost -----\$345



Includes an SDS chuck and a keyless 1/2-in. three-jaw chuck.



Milwaukee 5359-21

This tool (262-781-3600; www.milwaukee.com) performed well in the timed drilling test. The side handle is easy to attach and remove, and the tool features an easy-to-use depth stop that adjusts with a lever. Similar to the Makita, this tool has a "slip clutch" that disengages the rotary action if the bit binds during drilling. This is a great feature and should be standard on all large drills. The 5359-21 is a solid tool; I found nothing about it to dislike.

Capacity -----1 1/2 in.
 Weight -----8.3 lb.
 Drilling test -----27
 Cost -----\$345



Double-expansion anchors are similar to drop-ins. Their lead, top, and bottom wedges expand as the machine screw is tightened.



Rebar set in epoxy is commonly used for concrete dowels.