

14.4v Cordless Drills

TOOL TEST

We look at torque, stamina, and overall performance

BY ROLAND JOHNSON



CHUCK

Single-sleeve keyless chucks with an automatic shaft lock can be tightened with one hand (below left). The double-sleeve chucks (below right) require two-handed tightening.



GRIP AND BALANCE

Look for a handle that isn't too large for your hand. If you have the chance, try the fit before buying. Also, a drill-driver that is a little nose heavy can help you control the tool while drilling and driving.

BATTERY

Avoid battery mechanisms that are difficult to operate or require that you have a big hand in order to release the battery from the drill. Johnson prefers an easy-to-release battery over one with a longer run time.

I bought my first cordless drill in the mid-1980s thinking it would be great for those outdoor projects where no electricity was available. It quickly exceeded my expectations and became one of the handiest tools in my shop. At the same time, cordless drills had a profound effect on the portable power-tool industry, forging the way for many cordless tools to come.

Technology has changed cordless tools for the better since my first 9.6v Makita, especially in the areas of power, size, and cost. Manufacturers say that sales of 14.4v drill-drivers are outpacing lower-voltage models because they have more power and stamina than a corded drill and are reasonably lightweight and compact, making them appropriately sized for most wood-working tasks.

I spent a few weeks in my shop drilling, driving, and comparing the features and ergonomics of a dozen 14.4v drill-drivers from several major manufacturers. Two clear categories emerged. For just less than \$100, you can get a tool that will power through common drilling and driving tasks but that lacks stamina and heavy-duty parts. The drill-drivers in this category include those from Black & Decker, Delta, Hitachi, Ryobi, and Skil. Then there are the drill-drivers that cost closer to \$200. These beefier tools provide more power and stamina than you need for most tasks in a woodshop. The manufacturers of the higher-priced drill-drivers I tested are Bosch, DeWalt, Makita, Milwaukee, Porter-Cable, Ridgid, and Sears. (For more on the specs and performance of each tool, see the chart on pp. 46-47.)

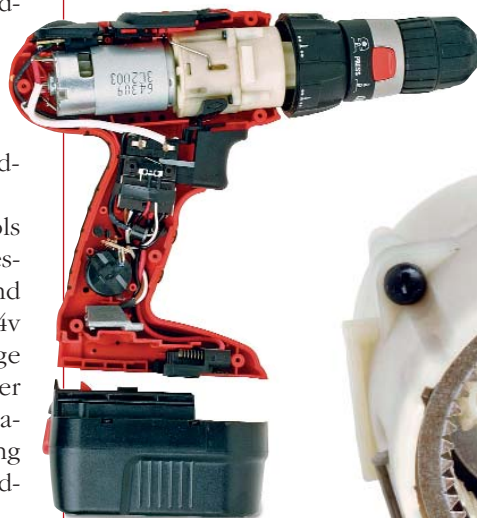
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Stamina will cost you

The first characteristic I looked at was stamina, which determines how long you can use a drill-driver before you need to swap its battery. While each tool came with two batteries, there still is a benefit to getting more out of each charge. I conditioned all of the batteries following manufacturer-recommended procedures. Each battery went through five charge/recharge cycles to achieve peak power.

On a fresh charge, all of the drill-drivers

What's the difference?



\$90

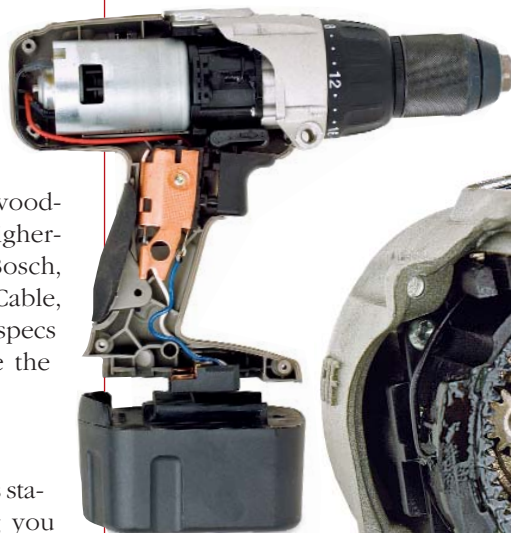
Black & Decker's transmission assembly is mostly plastic, but metal is used for select components.



There are two levels of pricing among the drill-drivers I reviewed. For less than \$100, you can choose from models aimed at the do-it-yourself crowd. For roughly twice that amount, you can buy a professional-grade drill-driver with higher-quality parts and plenty of stamina.

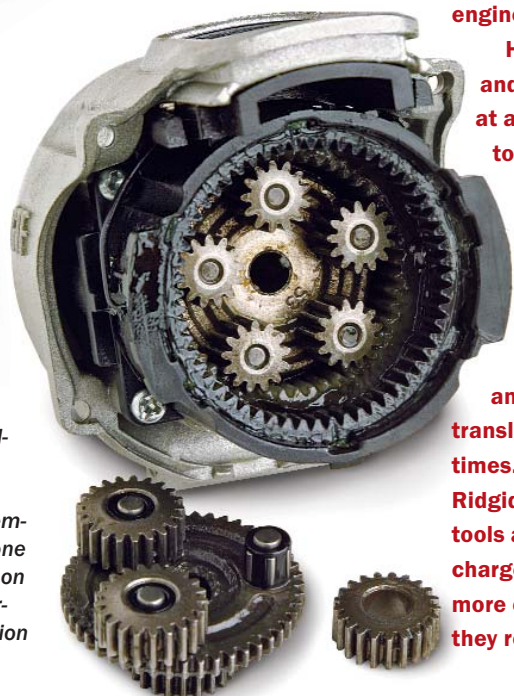
David Johnston, director of product development for construction tools at Porter-Cable/Delta, said the professional-grade tools benefit from high-quality features, such as single-sleeve chucks with carbide jaws, all-metal gears, substantial gear housings, as well as better motors and bearings than those in less-expensive drill-drivers. He also pointed out that there are fewer gimmicks (see p. 43) on professional-grade tools, with the higher cost of the tool paying for better engineering and materials.

High-quality batteries and chargers also come at a price, according to Kevin Fairchild, a product manager in Hitachi's cordless-drill division. That company's costlier drill-drivers feature batteries with higher amp-hour ratings, which translate to longer run times. Jason Swanson of Ridgid added that pricier tools also include battery chargers that are faster and more efficient in the way they regulate a charge.



\$170

Porter-Cable's drill-driver features all-metal gears in its transmission assembly. Additionally, one set of gears spins on roller bearings, further reducing friction between parts.



Most batteries recharge in an hour or less

Simple arithmetic proves that you likely will spend just as much time using your cordless drill-driver as you will charging the batteries. So it is important that the battery charger included with your drill is of good quality and easy to use.

Except for the Ridgid and the Black & Decker, each charger will power up a battery in one hour. Ridgid's charger can charge two batteries at once, and each takes just a half-hour. The Black & Decker, meanwhile, comes with a three-hour charger. The chargers for Delta and Skil failed during our tests but were replaced with functioning units by the manufacturer.

The method for releasing the battery from the drill-driver is also something to be concerned with. Some of the tools have batteries that drop from the handle, while others have batteries that slide off the handle. Neither design is better. However, the larger the battery, the more cumbersome it is to remove. I found the low-profile batteries on the Makita and Milwaukee were easy to grasp, while the Bosch battery was a bit of a handful.



Drop-release batteries.

About half of the drill-drivers tested have batteries that drop from the handle. This design can be cumbersome if the battery is large, as you have to stretch your hand around the battery to release it.



Better balance. The Milwaukee is one of several drill-drivers with a battery that slides on and off. The battery on the Milwaukee is unique in that it can be mounted in two directions (bottom) to change the center of balance for different operations.



Charge it. Nearly all of the drill-drivers tested come with a single, one-hour battery charger. The Ridgid is an exception; it recharges two batteries at a time and takes only a half-hour for each.

were able to run 2½-in.-long #8 wood screws into sheets of medium-density fiberboard (MDF) and blocks of hardwood longer than my arm could bear.

So rather than measuring stamina by driving screws until the batteries simply ran out, I decided that I could get comparable results by boring holes repeatedly with a 1½-in. spade bit, which consumes a lot of power. With each drill-driver, I bored as many holes as I could into 1-in.-thick red oak before the battery power was drawn down far enough that the spade bit would no longer cut. I identified a wide variation between the shortest and longest run times, especially between the tools in the two price categories.

Of the higher-priced drill-drivers I looked at, the best performer was the Makita, which bored 22.75 holes. The Sears Craftsman cashed out at 14.5 holes—the lowest performer in its category—with the others falling somewhere in between. Of the less-expensive drill-drivers, the Ryobi model performed the best, boring 10.25 holes, compared with the Skil, which stopped cutting after just more than 4.6 holes.

This test proved that you get what you pay for: The best performer among the pricier drill-drivers bored more than twice

Are bells and whistles just noise?

There really are only a few useful features that manufacturers have added to cordless drill-drivers. Blinking lights and belt clips don't enhance the power or performance of a drill-driver, so don't let those features influence your buying decision.

Some features, however, are valuable. There's nothing worse than reaching for your cordless drill-driver only to find that it's missing bits. One convenient feature that manufacturers have incorporated into drill-drivers is built-in bit storage. All of the drill-drivers tested, except the Milwaukee and Sears Craftsman, have storage on the handle or motor casing for driver bits. The Ryobi also has a magnetic plate on its base that holds drill bits and screws.

Bubble levels integrated on the top or back side of the motor housing also are useful when you must drill plumb in the vertical or horizontal position. However, built-in levels don't guarantee accuracy, perhaps because while the drill might be level, the workpiece might not.

Auxiliary handles, which come with the Milwaukee and Ridgid, also can be advantageous. They are especially convenient when trying to control the power of these tough tools while boring large holes or driving large screws.



Bells and whistles. Skil wins the prize for the most doodads on its drill-driver, including a removable stud finder, which also lights up when the drill is in use.



Check for level. The Ryobi drill-driver features two bubble levels, including a bull's-eye level on the back end that helps align the tool 90° for vertical drilling.

as many holes as the best performer among the less-costly tools.

Torque, power are measures of toughness

Torque, the amount of force applied to the driver or bit, is one of the most important characteristics of a drill-driver. Another important characteristic is power. To measure these, we consulted technicians at the test facilities at Consumers Union (for more on the tests, see the story on p. 45).

Each drill-driver was tested on multiple runs, each time with a fresh battery. The results of the tests were combined into a single rating. Again, there was a difference between the two categories of tools. All of the low-cost drill-drivers received a good rating, while the higher-priced tools received a very good or excellent rating.

The Ridgid and Bosch took the two top spots in both of the tests, and the Hitachi finished last in both tests. The Milwaukee rated third in power but was middle of the

road in torque, while the Craftsman rated third in torque but scored a middle-of-the-road rating in power.

Adjustable speed adds control

All of the drill-drivers have two speed settings, with the exception of the DeWalt, which has three. Generally, the low-speed setting produces high torque at a slow speed. (This can be compared to putting a car in low gear to climb a steep hill.) The low speed is best for driving screws and boring large holes. The high-speed setting produces less torque and is useful for drilling small holes, especially in metal. All of the drill-drivers also have pressure-sensitive triggers; the harder you squeeze the trigger, the faster the chuck spins.

Each drill-driver has an adjustable clutch, which stops driving a screw when a certain amount of torque has been reached. This function can be used to prevent stripping a



Get a handle on your drill. The Ridgid, as well as the Milwaukee and Bosch, comes with a removable auxiliary handle that provides extra leverage when boring large holes or driving large screws.

screw head or driving a screw too deep. All of the drill-drivers have in excess of 16 different torque stops.

Chucks should grip tightly with little runout

All of the power in the world is useless if it can't be applied to the cutting edge. A chuck that can't grip a bit tightly not only wastes the power of the drill-driver, but it also wreaks havoc with the bit's shank.

In the days of keyed chucks, it was essential to tighten the chuck at all three positions for heavy drilling. The advent of keyless chucks—a feature found on all of the drill-drivers tested—has eliminated the need for a key. However, some of the keyless chucks were not so easy to tighten.

Most of the keyless chucks in this review accept ½-in.-dia. shanks, but the Black & Decker, Delta, Hitachi, Ryobi, and Skil are limited to ⅜-in.-dia. shanks.

The drill-drivers also feature one of two different styles of keyless chucks: a ratchet-style, single-sleeve chuck with an automatic shaft lock, or a double-sleeve chuck.

Single-sleeve chucks are designed to be tightened with one hand. I was able to crank these chucks real tight without too

much stress on my hand, something the arthritis in my thumb joints appreciated. I especially liked the knurled-metal single-sleeve chucks on the Milwaukee, Porter-Cable, and Ridgid. They were easier to grip than the plastic kind.

Drill-drivers with a double-sleeve chuck were difficult to tighten, requiring me to hold one of the sleeves with one hand and crank the second sleeve with the other. If either sleeve was too small, it was difficult to get a good enough grip to tighten it thoroughly. That was the case with the Hitachi and Ryobi. The Hitachi was particularly hard to tighten with its short, tapered front sleeve. The double-sleeve chucks on the Delta and Black & Decker were large enough to get both my hands around.

Testing the gripping power—To measure the grip of the various chucks, I in-

stalled a 1½-in. Freud Diablo Forstner bit into each of the drill-drivers and bored into 3-in.-thick pine and red oak. I colored the shank of the Forstner bit with a marker; if the bit turned in the chuck jaws, a visible streak was left on the shaft. Some of the chucks could be tightened enough to actually leave indentations in the bit shank from the hard edges of the chuck jaws.

Each of the single-sleeve chucks gripped the bit shank hard enough to keep it from slipping under the most severe wood-boring conditions. But some of the double-sleeve chucks showed signs of slippage. The Black & Decker and Hitachi slipped while boring into both the hardwood and softwood samples. The Ryobi and Makita held firmly in softwood but showed signs of slippage in hardwood.

Measuring chuck runout—While not as critical with a handheld drill-driver as with a drill press, chuck runout still is a concern.

Too much runout can make accurately placing a spinning bit nearly impossible, and a wobbling bit can rob



More power from 15.6v drills

Three manufacturers—Metabo, Panasonic, and Hilti—don't make 14.4v drill-drivers and instead have equipped their midsize tools with 15.6v batteries. These tools are a little more expensive than the 14.4v models tested (except for the \$425 Hilti, which is aimed at professionals), but they performed slightly better overall.

A Metabo representative said that the company produces a higher-voltage midsize drill-driver because it was able to “provide a more powerful drill, while remaining price-competitive.” Its drill-driver is roughly \$10 more than the highest-priced 14.4v tool, similar to the Panasonic.

The three 15.6v drill-drivers had more stamina in the 1½-in. hole-boring test, compared with the 14.4v models. Each one outlasted the 14.4v drill-drivers in the number of holes bored, with the Hilti taking the top spot at 27.75. The Metabo and Panasonic were not far behind. However, they didn't stand out on the torque and power tests. The Metabo got an excellent score, trailing only the two top 14.4v performers, while the Panasonic and Hilti received very good ratings.

Weight also isn't much of a concern with the 15.6v drill-drivers. The Panasonic and Hilti weighed in at just under 5 lb., consistent with the high-priced 14.4v models. The Metabo was about 6½ lb. but still not any heavier than the biggest 14.4v model.

Better but not necessarily bigger. The 15.6v drill-drivers from Metabo, Panasonic, and Hilti are powerful and have more stamina than the 14.4v models, without being much bigger or heavier.

power while creating less than perfectly round holes. Any excessive out-of-round motion will cause larger bits to jam easily; spade bits are especially prone to jamming.

Most of these drill-drivers had commendably low runout. The best was the Makita, with 0.002 in. of runout. The worst was the Black & Decker, which has a quick-release chuck that was removed easily to facilitate hex-shaft bit use; but the chuck fit poorly on the drill shaft, resulting in 0.022 in. of runout.

My choices

After I spent a few weeks in the shop getting to know the drill-drivers, the Milwaukee stood out. Its power was controlled easily with a sensitive trigger, and its fairly slim handle fit my hand nicely. The ½-in. chuck was one of the best and most pleasant to use. The Milwaukee has no gimmicks; it's just a smooth-running, powerful tool.

With a great drill chuck and smooth power, the Porter-Cable is a close runner-up. But I had trouble changing the battery, and this tool didn't score as high on the stamina test.

Among the lower-priced drill-drivers, Best Value goes to the Ryobi. It bored the most holes on a single charge and performed the best in the torque and power tests among the tools in its price category. The magnetic pad on the base of the handle for holding loose bolts and screws was one of a few useful extra features.

A close second for Best Value is the Hitachi. While it trailed the competitors in both the torque and power tests and had problems with slippage, it excelled as a workbench tool. Its light weight and compact size made it great for running small screws and boring small holes; and it won't wear you out by the end of the day. □

Roland Johnson is a contributing editor.

Independent lab tests torque and power

To find out just how tough these tools were, the test lab at Consumers Union, publisher of *Consumer Reports*, put each drill-driver through a series of rigorous and methodical tests to measure their overall power.

The first test measured torque, using a similar method as employed by manufacturers: The drill-driver was mounted in a vise and chucked up to a static digital-reaction torque meter. It measured the amount of torque in inch-pounds (in.-lb.), by recording the twisting force of each drill-driver. With the exception of the Makita and Ridgid, the test results came in lower than what manufacturers stated in their product literature. The DeWalt and Milwaukee scored more than 100 in.-lb. lower than their advertised numbers.

Next, the drill-drivers were mounted in a dynamometer to test maximum power output: The drill-driver was brought up to full speed, and then a load was put on the tool until it nearly stalled. The test results, measured in watt-seconds, recorded the energy created at peak output. In practical terms, this test measured the amount of power the drill-driver could deliver when twisting a bit through a workpiece.



Testing torque. Peter Sawchuck, an engineer with Consumers Union, measured torque at a lab in Yonkers, N.Y. (left). Each drill was mounted in a dynamometer (above) to measure power.



Drills under \$100

BLACK & DECKER FSD142K-2 FIRESTORM

Editor's note: Black & Decker plans to replace this drill-driver with the FS1402D.



DELTA SHOPMASTER CL144



HITACHI DS14DVF

Editor's note: Hitachi plans to replace this drill-driver with the DS14DMR.



RYOBI SA14402



SKIL 2587-05



Drills over \$100

BOSCH 33614



DEWALT DW983 XRP



MAKITA 6337DWDE



MANUFACTURER/ MODEL	CONTACT	PRICE	WEIGHT	TRANSMISSION ASSEMBLY*
DRILLS FOR LESS THAN \$100				
Black & Decker FSD142K-2 FireStorm	www.blackanddecker.com 800-544-6986	\$90	4.2 lb.	Plastic and metal
Delta ShopMaster CL144	www.deltawoodworking.com 800-223-7278	\$60	4.5 lb.	Metal
Hitachi DS14DVF	www.hitachi.us/hpt 800-829-4752	\$89	3.7 lb.	Plastic and metal
AUTHOR'S BEST VALUE CHOICE Ryobi SA14402	www.ryobitools.com 800-323-4615	\$90	4.4 lb.	Metal with plastic ring gear
Skil 2587-05	www.skil.com 877-754-5999	\$80	4.2 lb.	Metal
DRILLS FOR MORE THAN \$100				
Bosch 33614	www.boschtools.com 877-267-2499	\$180	5.3 lb.	Metal
DeWalt DW983 XRP	www.dewalt.com 800-433-9258	\$189	5.3 lb.	Metal
Makita 6337DWDE	www.makita.com 800-462-5482	\$199	5 lb.	Metal
AUTHOR'S BEST OVERALL CHOICE Milwaukee 0616-20	www.milwaukeetool.com 800-729-3878	\$190	5.8 lb.	Metal, except for shift from first to second gear
Porter-Cable 9978	www.porter-cable.com 800-321-9443	\$170	5.7 lb.	Metal
Ridgid R83015 X2	www.ridgid.com 800-474-3443	\$189	6.3 lb.	Metal
Sears Craftsman 26927	www.craftsman.com 800-349-4358	\$170	4.7 lb.	Metal

*According to manufacturers.

**Spade-bit test measured how many 1½-in.-dia. holes each drill-driver could bore in 1-in.-thick red oak on a single battery charge.

***Torque/power rating combines the results of two tests performed four times (see p. 45).

MILWAUKEE
0616-20



PORTER-CABLE
9978



RIDGID
R83015 X2



SEARS
CRAFTSMAN
26927



CHUCK STYLE/ PERFORMANCE	RUNOUT	DRILLING TEST**	TORQUE/ POWER RATING***	BALANCE	GRIP	RECHARGE TIME	COMMENTS
Two-piece sleeve, metal and plastic/Good	0.022 in.	4.75 holes	Good	Good	Good	Three hours	The manufacturer promises upgrades with its replacement; Quick Connect bit system created problems with runout.
Two-piece sleeve, metal and plastic/Good	0.003 in.	4.75 holes	Good	Fair	Good	One hour	A no-frills drill-driver with good power for the low-buck category; small chuck; difficult-to-release battery.
Two-piece sleeve, metal and plastic/Fair	0.005 in.	6.25 holes	Good	Good	Good	One hour	Compact size and light weight make this a nice drill, but tapered chuck was difficult to tighten.
Two-piece sleeve, metal and plastic/Fair	0.008 in.	10.25 holes	Good	Good	Good	One hour	The most powerful of the low-buck tools with features such as a magnetic pad for holding screws; small chuck.
Single sleeve, plastic/ Excellent	0.005 in.	4.63 holes	Good	Good	Excellent	One hour	The only low-cost drill-driver with a single-sleeve chuck; stud finder and other gizmos aren't very useful in the shop.
Single sleeve, plastic/ Excellent	0.006 in.	18.5 holes	Excellent	Fair	Fair	One hour	Plenty of power and high-quality build; but overly large handle.
Single sleeve, metal and plas- tic/Excellent	0.008 in.	17 holes	Very good	Good	Good	One hour	The only drill-driver tested with three speed settings; solid tool; the chuck held bits tightly.
Double sleeve, metal, with shaft lock/Fair	0.002 in.	22.75 holes	Very good	Fair	Good	One hour	Easy-to-change battery; tons of power; textured chuck has automatic shaft lock but requires two-handed tightening.
Single sleeve, knurled metal/ Excellent	0.003 in.	21.75 holes	Excellent	Excellent	Excellent	One hour	Bidirectional battery mount provided good balance; tons of power; lacks bit storage.
Single sleeve, knurled metal/ Excellent	0.004 in.	20.25 holes	Very good	Good	Excellent	One hour	Solid, well-built tool; great chuck; good power; battery changing was awkward.
Single sleeve, knurled metal/ Excellent	0.005 in.	18.13 holes	Excellent	Good	Good	30 minutes	Great chuck; dual battery charger; lots of muscle; but the drill-driver is too heavy for delicate woodworking tasks.
Single sleeve, metal and plas- tic/Excellent	0.005 in.	14.5 holes	Very good (plus)	Good	Fair	One hour	A reasonably powerful drill-driver and a solid performer, but it has a fat grip and lacks bit storage.