TOOL TEST

12-Volt Drill/Drivers

The new generation of lithium-ion subcompacts are lightweight and surprisingly powerful for their size

by Bruce Greenlaw

I started out in the trades right before the cordless revolution, when many of us had at least two corded drills: a powerful ½-inch one with a side handle for the big stuff and a lightweight ⅜-inch model for the rest. Just because we've ditched the cords for most of our drilling and driving doesn't defate the logic of having both sizes. I was reminded of that recently when I used my ½-inch 18-volt Milwaukee hammer-drill — which weighs 6.2 pounds — to bore lots of ⅛-inch pilot holes in composite decking and cedar; a lightweight ⅜-inch cordless drill/driver would have handled the job easily while giving my forearms a break.

Weighing just 2.1 to 2.6 pounds, the latest 12-volt ⅜-inch subcompacts are not only small and light enough to ride in a pocket or a toolbelt, but their surprising power and advanced features can make them an ideal complement for remodelers, electricians, plumbers, and hvac installers and a prime tool for finish carpenters and architectural woodworkers.

For this tool test, I was shipped seven subcompact kits: the Bosch PS31-2A, the DeWalt DCD710S2, the Hitachi DS10DFL, the Makita FD02W, the Milwaukee 2410-22, the Porter-Cable PCL120DDC-2, and the Ridgid R92009. After drilling enough holes and driving enough screws to numb the tip of my trigger finger, I've summed up their power, runtime per charge, and ease of use.

Drill/Drivers Versus Drivers

All the subcompacts I tested have a low and high variable-speed range and a versatile ⅜-inch keyless chuck. That's an important distinction, because Bosch, DeWalt, Hitachi, Makita, and Milwaukee also make similar subcompacts with ¼-inch hex chucks. Bosch's and Makita's hex-chuck models deliver the same torque and dual speed ranges as their ⅜-inch models, but those from DeWalt, Hitachi, and Milwaukee have less torque than their ⅜-inch counterparts and a single speed range with a top speed that's too slow for drilling most holes.

Also, many common drill bits don't have hex shanks. DeWalt calls its hex-chuck model, which delivers 0 to 1,050 rpm, a screwdriver rather than a drill/driver and targets it for 98 percent driving and 2 percent drilling.

Capacities

Most of the operator's manuals give drilling and driving capacities, and the figures are pretty consistent; you can routinely bore holes up to about ¼ to ⅜ inch in diameter in mild steel, use spade bits up to about ¾ to ⅞ inch in diameter, and

Drill/Driver Specs

	 **Bosch** **PS31-2A** **877/267-2499** **boschtools.com**	 **DeWalt** **DCD710S2** **800/433-9258** **dewalt.com**	 **Hitachi** **DS10DFL** **800/706-7337** **hitachipowertools.com**	 **Makita** **FD02W** **800/462-5482** **makita.com**
Weight (pounds)	2.1	2.5	2.4	2.3
Length (inches)	6 11/16	7 1/2	7 13/32	7 7/16
Rpm	0–350/0–1,300	0–400/0–1,500	0–300/0–1,300	0–350/0–1,300
Maximum torque	265 inch-pounds	189 unit watts out	195 inch-pounds	200 inch-pounds
Charge time (minutes)	30	40	40	50
Runtime test results				
¾-inch holes per charge, 1st battery	33	42	30	22
¾-inch holes per charge, 2nd battery	34	39	31	15
Web price	$110	$140	$90	$125
Included in kit	2 batteries Charger Flat soft case	2 batteries Charger Contractor bag Belt hook	2 batteries Charger Plastic case 7-piece driver set	2 batteries Charger Plastic case Holster
Warranty	1-year for tool, battery, and charger; 1 year free service; 30-day satisfaction guarantee; Register for free ProVantage plan (3-year tool, 2-year battery, 1-year charger)	3-year for tool, battery, and charger; 1 year free service; 90-day satisfaction guarantee	Lifetime tool; 2-year for battery; 1-year for charger; 30-day satisfaction guarantee	3-year for tool; 1-year for battery and charger; 30-day satisfaction guarantee
Tester's comments	Bosch gave this midpriced tool more torque and a higher top speed than its predecessor (PS30-2A) and added a next-generation battery and an LED fuel gauge. It's the lightest and almost the shortest subcompact, but I found its soft-start feature more annoying than helpful (you've got variable speed for that). Also, the chuck on the one I tested had excessive side-to-side play, making big bits flutter.	This was the longest model tested and one of the heaviest, but it felt very light in all working positions, thanks to its bottom-mounted battery and slender handle. It's also a top performer, has a ratcheting chuck, and can stand upright (though the cantilevered battery could catch when I dropped it into my nail bag). It comes with a reversible belt hook and a zippered bag with enough room to accommodate a basic bit kit.	This no-frills budget model has an archaic two-sleeve keyless chuck that must be tightened and loosened by gripping the chuck with both hands. It also casts the longest headlight shadow. Although the tool is noticeably less powerful than the top performers when pushed hard, its protective electronics helped prevent it and the batteries from overloading.	Despite the new model number, this tool has been on the market for about two years and delivers a slower top speed and less power than the comparably priced front-runners. It also combines the shortest runtime with the longest charge time (not ideal for repetitive work) and is the only model that lets you drain batteries completely, which can shorten their lifespan; you need to swap them out as soon as you notice a power loss. The headlight stays on for several seconds after you release the trigger, a welcome feature in the dark.

continues on next page

Drill/Driver Specs (continued)

	 **Milwaukee** **2410-22** **800/729-3878** **milwaukeetool.com**	 **Porter-Cable** **PCL120DDC-2** **888/848-5175** **porter-cable.com**	 **Ridgid** **R92009** **800/474-3443** **ridgid.com**
Weight (pounds)	2.6	2.4	2.6
Length (inches)	7 3/8	7 13/32	6 5/8
Rpm	0–400/0–1,500	0–315/0–1,200	0–350/0–1,500
Maximum torque	275 inch-pounds	220 inch-pounds	300 inch-pounds
Charge time (minutes)	30	30	30
Runtime test results			
¾-inch holes per charge, 1st battery	44	30	43
¾-inch holes per charge, 2nd battery	42	31	39
Web price	$130	$90	$140
Included in kit	2 batteries Charger Plastic case	2 batteries Charger Flat soft case Belt hook	2 batteries Charger Flat soft case LED flashlight
Warranty	5-year for tool and charger; 2-year for battery; 30-day satisfaction guarantee	3-year for tool and charger; 2-year for battery; 1 year free service; 90-day satisfaction guarantee	3-year for tool, battery, and charger; 90-day satisfaction guarantee; Register for free Lifetime Service Agreement (free parts, service, charger, and batteries)
Tester's comments	The 2410-22 has been on the market for a couple of years but now ships with new and improved "Red Lithium" batteries. It aced the runtime test and has impressive performance specs — plus it has a metal ratcheting chuck that won't get chewed up by masonry or sharp-edged electrical boxes (the other subcompacts have plastic chucks). If you buy this model, make sure the batteries carry the Red Lithium label.	Porter-Cable and DeWalt are both Stanley Black & Decker brands, but their subcompacts are designed by separate engineering teams and manufactured in different locations, and have no common parts. Both are pro-grade, but the DeWalt is built for continuous duty and top performance and the Porter-Cable isn't — which is why it costs about $50 less. You also can't replace any internal parts on the Porter-Cable, so it's basically a disposable. Still, I liked the overall feel of the tool, and it handled my trials well. A reversible belt hook is included, plus a magnet up top that firmly grips a bit.	This third-generation tool is faster and more powerful than its predecessors. It qualifies as the shortest in the field yet delivers an impressive 300 inch-pounds of torque. The overmold grip is dimpled, making it easy to hold with sweaty hands or work gloves. The LED headlight stays on for more than 10 seconds after you release the trigger, and it flashes when the battery gets low. Like the DeWalt and the Milwaukee, the Ridgid has a ratcheting chuck to combat loosening.

drive common wood screws. (By comparison, the manual for my Milwaukee 18-volt hammer-drill says it can bore ½-inch holes in steel, power 1½-inch spade bits or 2 9/16-inch hole saws, and drive ¼-inch screws).

These are all practical numbers for repetitive work. Equipped with a ¾-inch spade bit, the subcompacts could consistently bore holes through 2-by Douglas fir at high speed in about five to 10 seconds, and they drilled a series of these holes for my runtime tests without any apparent overheating of the tools or the batteries. All of the subcompacts could also drill a 1½-inch hole, but it took me anywhere from 30 seconds to well over a minute to do it, and it's clearly not what they're made for (my 18-volt hammer-drill bores 1½-inch holes with ease in about 15 seconds or less).

All seven subcompacts also had enough power in low gear to sink a #10 by 4-inch Woodex deck screw in Douglas fir with-

Milwaukee's subcompact drill/driver (right) is much smaller than the author's 18-volt lithium-ion hammer-drill (left) and weighs about 3 1/2 pounds less.

out a pilot hole, but that also seemed to be pushing it. They all easily drove #9 by 3-inch Woodex screws.

About the Specs

I weighed each tool — battery included — on a postal scale. At 2.6 pounds, the Milwaukee and the Ridgid were the heaviest (see the spec chart on the two previous pages). By contrast, the Makita 6012HD 9.6-volt drill/driver that I got in 1985 (and depended on for years for finish carpentry and architectural woodworking) weighed 3.5 pounds.

To measure lengths, I lightly clamped each drill (with chuck jaws retracted) in a parallel bar clamp and measured the distance between the clamp jaws. You can see the difference between tools in the center photo at left.

Rpm and torque. Two years ago, the top speed in this category was 1,300 rpm and the highest maximum-torque rating was 220 inch-pounds. Now it's 1,500 rpm and 300 inch-pounds, similar to some of the 14.4-volt nicad models I've seen. Although manufacturers have yet to adopt a standard method for measuring maximum torque — and DeWalt uses "unit watts out" rather than the usual inch-pounds — the figures at least indicate relative power and are a good benchmark for comparing different platforms from the same manufacturer. The fastest and most powerful subcompacts I tested also had the longest runtimes.

Web price. To compare apples with apples, I priced all the kits at Amazon.com except for the Ridgid, which is sold exclusively by The Home Depot. Bosch and Milwaukee also sell the bare tool, for those who have already bought into their 12-volt platforms.

Included in kit. Some of the extras were really helpful, such as Ridgid's surprisingly bright one-watt LED flashlight, which in my trial run burned continuously for 11-plus hours on a charge.

Warranty. Ridgid will replace all parts that are defective or break down under normal use — including batteries and chargers — for the lifetime of the original owner, provided the kit is registered within 90 days. Hitachi's lifetime lithium-ion tool warranty, on the other hand, covers defects only and lasts as long as parts are available. That's a big difference. All the tools offer either a 30-day or 90-day money-back guarantee.

Bosch and Ridgid have been competing for a while to produce the shortest subcompact. At the moment, it's Ridgid (far right) over Bosch (far left) by a hair.

The author mounted a new Irwin 3/4-inch Speedbor spade bit in each drill/driver, then counted the number of holes he could drill through 2-by Douglas fir per charge in high gear. He tested both of the batteries included with each tool.

Runtime and Torque Tests

To test for runtime, I installed a new Irwin 3/4-inch Speedbor spade bit in each drill/driver, then counted the number of holes the tools could drill through 2-by Douglas fir in high gear on a single charge. I ran this test for both of the batteries included

with each tool. As the runtime figures in the spec chart show, DeWalt, Milwaukee, and Ridgid got the top scores and Makita brought up the rear, with Bosch, Hitachi, and Porter-Cable falling in between. Picking a winner would be splitting hairs.

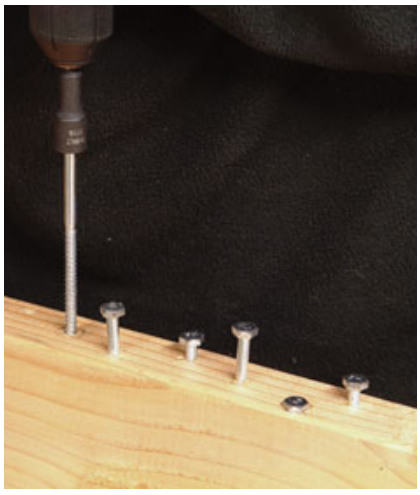
To get an idea of maximum torque, I drilled a series of 1/8-inch pilot holes 2 1/2 inches deep in Douglas fir and then drove two 1/4-inch by 4 1/2-inch lag screws as deep as possible with each tool in low gear. This stress test revealed as much about protective circuitry as it did about maximum torque.

The DeWalt and Porter-Cable both came within 1/4 inch of sinking the first lag screw before shutting themselves off to protect against overloading. They both sank the second one without interruption. The Ridgid sank the first screw without interruption and came within 15/16 inch of sinking the second screw before shutting off. The Hitachi came within 15/16 inch and 1 1/4 inches of sinking the first and second screw, respectively, before shutting itself off, and the Milwaukee did the same at 9/16 inch and 1 1/4 inches. After electronic shutoff, I reset each tool by simply releasing the trigger.

Finally, the Bosch came within 7/8 and 3/8 inch of sinking the two lags before slowing to a stall, while the Makita did the same thing at 3/16 and 3/8 inch. In other words, those two tools offered no apparent protection against overloading, though common sense isn't a bad substitute.

Favorites

The DeWalt, the Milwaukee, and the Ridgid are my clear-cut favorites. They're a bit heavier than the others, but they pack the most punch and runtime, are user-friendly, and appear to be built for the long haul. Each has its strong points: The DeWalt is beautifully balanced, the Milwaukee is part of the biggest and most diverse 12-volt platform, and the Ridgid is the shortest on the market and offers a warranty that includes free parts and batteries for life. The best choice for you depends on your particular needs.



To gauge the balance between maximum torque and overload protection, the author drilled 1/8-inch by 2 1/2-inch pilot holes in Douglas fir and then drove two 1/4-inch by 4 1/2-inch lag screws as deep as possible with each tool.

Bruce Greenlaw is a JLC *contributing editor.*

Noteworthy Features

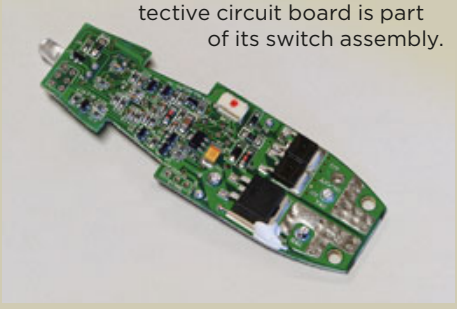
Battery gauges. The Bosch and Milwaukee tools both have onboard battery gauges so that they don't unexpectedly run dry. Ridgid's headlight blinks to indicate a dwindling charge.

Batteries. Five of the subcompacts have stick batteries, which create beefy handles that some people don't appreciate — but the batteries don't snag when you park your tool in a nail pouch. The DeWalt has a slide-type battery (above, far left) and the Hitachi has a post-type one (above, far right). These two tools are better-balanced, have slender handles, and can stand upright easily. Available as an accessory, Milwaukee's optional 48-11-2402 Red Lithium XC battery (right), which costs about $52, also makes a stable base while doubling the runtime.

(continues on next page)

Noteworthy Features (continued)

Protective circuitry. Most of the tools have some measure of electronic protection against overloading, overheating, and deep discharge. Milwaukee's protective circuit board is part of its switch assembly.



Headlights. All the drills have trigger-activated LED headlights, but the chucks on several cast a shadow on the bull's-eye unless you're working with long bits or fasteners. Bosch (below left), Milwaukee, Porter-Cable, and Ridgid have the best clearance, while Hitachi (below) has the worst. For added versatility, the Makita and Ridgid tools stay lit for several seconds after you release the trigger and then slowly fade out.

Belt hooks. All the models can be carried in a toolbelt, but only the DeWalt and Porter-Cable have belt hooks, both of which are reversible. DeWalt's hook (below) has a deep opening that easily clips over thick leather, but Porter-Cable's rear mount (right) makes for a quicker draw. The Makita ships with a belt holster instead of a hook.

Chucks. The ratcheting chucks on the Milwaukee (left), DeWalt, and Ridgid have a split bite on each jaw for a better grip. The chucks don't actually ratchet; instead, audible clicks come from a spring-loaded mechanism that helps prevent them from vibrating loose. Milwaukee's subcompact is the only one with a metal rather than a plastic chuck.

Contractor bag. You can get your stuff in and out of DeWalt's zippered contractor bag quickly, and there's room left over for a small case of drill and driver bits. Still, it could be a little bigger.