

Tool companies have increased cordless tool voltages, broadened their lines, and fine-tuned their efficiencies. Now they're focusing on battery technologies.

Battery Battle

By Mark Clement

Cordless tools do more and do it better every year. Their gearing becomes more efficient, materials get lighter and stronger, and ergonomics improve. But engineers know that ergonomics are window dressing compared with performance, and they continually focus on ways to improve battery life and power. Manufacturers who want to increase batteries' cycle lives also want to increase run time per charge, which enhances tool performance in the field. They also are looking into new battery chemistries that'll make tools lighter, stronger, and longer running.

Two main battery chemistries power cordless tools, NiCad and NiMH. While NiCad remains the standard, companies like Panasonic and Makita believe that NiMH systems provide the best performance. Since significant differences between the two battery chemistries affect their performance, life cycles, and run times, the question is, Which technology will lead the next era in cordless tool development?

The relative newcomer, NiMH is grabbing attention because it runs longer per charge than NiCad does, according to engineers. A NiMH battery stores more of the chemicals and materials that generate direct current, so it produces more amp-hours than a NiCad

pack of equivalent volume does. NiMH batteries can work longer between charges. They're also lighter than their NiCad equivalents and are said to be less harmful to the environment if they're dumped into the waste stream.

Makita, Milwaukee, and Panasonic say the future of cordless power tools lies in NiMH technology. So why haven't all the cordless tool manufacturers made the leap to NiMH? Many European toolmakers have, partly because European consumers and legislators are generally more sensitive to environmental issues than Americans. Some European governments have either taxed NiCad batteries so heavily they've become cost-prohibitive, or they've regulated cadmium batteries so that users must buy NiMH-powered products—or plug in. That's why tool companies like Bosch, DeWalt, and Metabo are selling NiMH-powered tools in European markets even though they aren't marketing them in the United States.

Stateside, there's little pressure to change over to NiMH technology and more time to test it. Manufacturers like Bosch, DeWalt, and Porter-Cable say NiMH has potential, but their lab tests indicate that their users get the best overall tool performance, longest work hours, and longest cycle life from NiCad. Toolmakers say that lab tests can't truly mimic jobsite rigors, so their conclusions are less conclusive.

Cycle life is defined as the number of times a battery can be charged and discharged before its run time falls below a predetermined value, often 50 to 70 percent of its original capacity. Measuring cycle life in the field doesn't require special equipment: A pack is shot when it spends more time in the charger than on the tool.

Some toolmakers maintain that NiMH has a shorter cycle life than NiCad does. Panasonic, the industry's only manufacturer that makes both batteries and tools, says that's not so. The company guarantees similar cycle lives between its NiMH and NiCad packs. Depending on use, that amounts to 1200 to 2000 charge/discharge cycles. Plus, Panasonic says, NiMH batteries with longer run times have more total working hours.

Makita engineers tell a similar story. Their testing reveals that higher amp-hour (1.7 to 3.0) NiMH batteries provide slightly fewer charge/discharge cycles but provide their tools with more total run time than equivalent NiCad packs do. That means the battery spends more time on the tool than in the charger and works longer. Panasonic and Makita agree, charger technology is very important for all power packs, but especially for NiMH cells.

A few years ago, the companies involved in the voltage race tried to get more cells in NiCad battery packs to

(continued on p. 50)

Here are a few handheld tools you may find interesting, although some are corded versions.

Cordless hammer drill

The model 9984 hammer drill/driver runs on 19.2-volt, 2.4-amp-hour batteries and comes with soft, adjustable grips



in three sizes. With 470 inch-pounds of torque, a 3-stage planetary gearing system, and an adjustable clutch, it comes with a two-speed gearbox. It has a low speed for maximum torque and control and a high speed for rapid drilling up to 1500 rpm. In hammer mode, the tool provides up to 19,500 bpm. At 6.2 pounds, the item comes with a shock-resistant case with a bit storage compartment. *Porter-Cable Corp.*, 800-321-9443, www.porter-cable.com. **Circle 1.**

New rotary hammer

Bosch introduces its newest and most durable rotary hammer. The 11250VSR Bulldog offers a larger 6-amp motor, which provides 1350 rpm in rotation mode; in rotary hammer mode it produces 6000 bpm at 1.4 foot-pounds of impact energy with each blow. The integral clutch helps minimize torque. The tool's ergonomic pistol handle comes with a soft grip, and the auxiliary handle provides extra control. *Bosch Power Tools*, 877-267-2499, www.boschtools.com. **Circle 2.**



Cordless impact wrench

Milwaukee Electric Tool's new 18-volt, 3/4-inch cordless impact wrench features 325 foot-pounds of torque, a new level of power that allows users to do jobs that were previously impossible with a cordless impact wrench. The tool has a variable speed switch for greater control and a speed range up to 1350 rpm. The energy to achieve the greater torque comes from a new impacting mechanism that provides 2150 impacts per minute. The impact wrench also features great balance and a soft-grip handle for greater comfort. The battery can be reversed to get into tight spaces or for better balance in overhead use. The tool comes with two 2.4-amp-hour NiCad batteries, a 120-volt universal charger, and an impact-resistant carrying case. *Milwaukee Electric Tool*, 262-781-3600, www.mil-electric-tool.com. **Circle 3.**

Cordless combo kits

The company is offering two Cordless Combo kits, each featuring a range of 18-volt tools. The R921 kit includes a center-handle hammer drill, circular saw, light, two high-capacity batteries, and dual-port charger. The R922 includes the same tools and accessories as the other



kit, with the addition of a reciprocating saw. Both kits come in a water-resistant canvas bag, which has a hinged metal frame that stays open for fast, easy loading. *Ridgid Inc.*, 800-474-3443, www.ridgid.com. **Circle 4.**

Ergonomic electronic caulking gun

The 1000 series cartridge-style, electronic caulking gun is a new battery-powered dispensing tool that is ergonomically designed to reduce hand fatigue. Just a slight squeeze produces a smooth non-stop flow. The preset pressure release and automatic reverse cut down on the drip and mess. Accessories include 12-volt and 14.4-volt battery packs, a universal charger, and assorted nozzles. *Albion Engineering Co.*, 215-535-3476, www.albioneng.com. **Circle 5.**



Demolition hammer

The H45MR SDS-Max Shank demolition hammer offers increased impact energy, reduced vibration, and less tool exertion in comparison with previous models. The company's dual housing design, which features an aluminum housing and injection-molded inner nylon core, provides high durability. The hammer is equipped with a mechanism that prevents idle hammering; this feature reportedly enables users to perform tasks requiring detailed attention and increases the tool's service life. *Hitachi Power Tools*, 800-829-4752, www.hitachi-powertools.com. **Circle 6.**

Cam-action hammer/drill/driver

Equipped with a 1/2-inch chuck, the SF 180-A cordless cam-action hammer/drill/driver can drill into a range of base materials, include masonry, light concrete, steel, and wood. The versatile tool can handle a variety of anchors and screws, including plastic anchors, machine screws, wood screws, and others. It has been enhanced with 15% greater gear-teeth height for improved performance. In addition, the company's NiHM battery and charging technology reportedly help the tool perform consistently and with a longer run time. *Hilti*, 800-879-8000, www.us.hilti.com. **Circle 7.**

Hammer drill with 5.8-amp motor

The SBE660 hammer drill—suitable for drilling concrete, brick, steel, and other materials—features a 5.8-amp motor. Its two-speed gear train permits the user to choose the drilling speed appropriate for



the material, making a wide range of applications possible. The die-cast aluminum gearbox dissipates heat for longer tool life, and the 360-degree side handle is said to provide a high level of operator comfort. *Metabo Corp.*, 800-638-2264. www.metabousa.com. **Circle 8.**

Long-lasting rotary hammers

The D25303K and D25304K compact 1-inch SDS rotary hammers are designed to last long and hit hard, while provid-



ing favorable control when used to drill and chip concrete, masonry, tile, and asphalt. Rated at 7.5 amps, the heavy-duty electronic variable-speed motor delivers 2.3 foot-pounds of impact energy, and it drills faster than other tools in its class. *DeWalt Industrial Tools*, 800-433-9258, www.dewalt.com. **Circle 9.**

Demolition hammer

The HM1304B is a 35-pound demolition hammer that can break, chip, and dig in horizontal and vertical positions. It offers a 13-amp motor delivering 1450 bpm



and 27.5 joules of impact energy. The rugged side handle swivels 360 degrees and adjusts laterally to several different positions. *Makita USA*, 800-462-5482, www.makitatools.com. **Circle 10.**

power bigger tools. Now there's a technology race to master emerging battery chemistry. Bosch, DeWalt, Milwaukee, and Porter-Cable are improving performance on their NiCad platforms but are continuing to test NiMH technology.

Panasonic (which still makes NiCad-powered tools), Makita, and Milwaukee are moving forward with the newer platform. Panasonic is leading the way with the first 3.5 amp-hour NiMH battery, the highest capacity currently available. Meanwhile other toolmak-

ers see plenty of mileage left in NiCad chemistry, and amp-hours also are said to be going up.

More power?

Amp-hours. Since amp-hours measure run time, you might say they measure the size of the gas tank, not the motor's power. A 3-amp-hour battery works longer on a single charge than a 1.7-amp-hour battery, toolmakers say. So, if you spend long periods of time away from a charger or you just like

the idea of a long-lasting battery, go for high amp-hours—either NiCad or NiMH. But higher amp-hour batteries have shorter cycle lives. They also heat up more than lower amp-hour batteries do, and that reduces the number of times they can be charged. That's equally true for NiCad and NiMH batteries.

Power and run time. Power is a nebulous term in the tool world—especially in cordless tools—because you have to measure both the battery and the motor efficiencies. Since motor efficiency ratings aren't published, here's another good rule of thumb: Run time (expressed in watt hours) = volts x amp-hours. Keep in mind that this doesn't have anything to do with cycle life.

But, tool power does have a lot to do with battery cells. A larger pack provides more stored energy than a smaller pack. But power is also derived from a tool's motor, gearing, and mechanical efficiencies beyond the battery. So, although you can't necessarily judge a tool's performance by its battery alone, you have to start somewhere, and the battery is the only place you'll find enough information.

Manufacturers like Bosch, DeWalt, and Makita have cranked up their voltage platforms to 24 volts, and they supply seriously high-drain tools. Toolmakers have discovered that users buy more 24-volt specialty tools like rotary hammers and circ and miter saws separately than in kits. Combo kits are hot items in the 18-volt world, where a

Battery recycling

Recycling your cordless tool, phone, laptop, and any other rechargeable batteries just got easier. You can still collect and mail them in as you might have done before, but now you can drop off your spent batteries at national retailers. The Home Depot, Sears, Staples, and some tool repair centers (complete list follows) now take both tool and electronics batteries. This keeps large numbers of batteries out of landfills

where the collective millions of pounds of chemicals in them can cause environmental problems.

The Rechargeable Battery Recycling Corporation (RBRC), an organization partnered with industry to get rechargeable batteries out of the waste stream, makes this possible. RBRC, in the first 6 months of 2003 alone has collected 2 million pounds of rechargeable batteries (an increase of 30%). RBRC estimates

that cordless tool batteries make up 10% to 15% of this collection.

Participating Retailers:

ALLTEL
Batteries Plus
Best Buy
BLACK & DECKER
Cingular Wireless
Circuit City
The Home Depot
Milwaukee Electric Tool
Porter-Cable Service Centers
RadioShack
Remington Product Co.

Sears/Orchard Supply
Staples
Target
US Cellular
Verizon Wireless
WAL-MART
Wireless Zone

To find nearby battery drop-off locations, call 8BATTERY (1-800-822-8837) or log on to www.rbrc.org, type in your zip code, and you will find a list of participating retailers and community collection programs.

drill/driver isn't too heavy and the saws get the job done quickly. Milwaukee and Porter-Cable have found comfortable ceilings below 24 volts. Milwaukee platforms many of its high-draw tools on 18-volt batteries with 2.4 amp-hours, while Porter-Cable focuses on 19.2 volts with 2 amp-hour/batteries.

Twelve- and 14.4-volt platforms are still the most popular for drill/drivers, which are far and away the best-selling cordless tools sold. However, there's been major growth in 18-volt platforms like those offered by Bosch, DeWalt, Milwaukee, and Porter-Cable. Metabo has some of its higher powered drills on a 15.6-volt platform, which provides the best combination of weight and power, the company says. Panasonic uses the same platform for many of its drills and saws because its higher capacity NiMH cells produce the same torque, performance, and run time as 18-volt NiCad cells but reduce tool size and weight.

Recharge

While NiMH vies for widespread use in the cordless tool market, the concept people at the battery manufacturers have their eyes set several years down the road on lithium ion battery chemistry. It's lighter than NiMH, lasts longer, and takes up less space, but its performance characteristics need work to make them effective for power tools. Makita and Panasonic say they've mastered NiMH technology and have built a better cordless mousetrap with environmentally friendly batteries. Others say NiCad's longer cycle life and better performance make it the superior technology.

A business element influences these positions. It's expensive for a company to re-engineer its tools. Makita and Panasonic have gone first, and it looks like the rest of the industry is waiting to see what comes next. But, while you're in your tool store trying to make a choice, remember this: A tool's feel, balance, weight, and features are still vital. ■

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