



# Better Batteries for Cordless Tools

Nickel-metal-hydride batteries pack a lot of power, keep a charge longer than nickel-cadmium batteries and don't have to be recycled

BY DENNIS PRESTON

**M**ore power! More power! More power!" The mantra of TV's *Home Improvement* tool junkie Tim Taylor is shared by cordless-tool users and manufacturers alike. That's why you will soon see cordless tools equipped with a nickel-metal-hydride (Ni-MH) battery pack instead of the familiar nickel-cadmium (Ni-Cd) pack. Continuous improvement of Ni-Cd batteries, the driving force in cordless tools, has fueled the inexorable push for more power. Over the years, Ni-Cd batteries have gotten better—higher output, longer run time and faster recharging. However, after two decades as the industry's prime mover, Ni-Cd battery technology may be topping out while the demand for more power continues.

Initially, Ni-Cd batteries delivered 1.0 amp-hour, the amount of electrical current

that can be delivered in a given period of time. They now produce about 2.0 amp-hours—double those first used in power tools in the early 1980s. Ni-Cd batteries will probably max out at 2.4 amp-hours. The power-tool industry is looking at 3.0 amp-hours as the next big step.

## High energy density: the holy grail of battery design

Cordless power-tool users want drills and saws that deliver a lot of power for a long period of time between charges. To meet this demand, manufacturers continue to research and develop batteries with high energy density, that is, batteries with more power in smaller, lighter-weight packages.

In the past, cordless-tool manufacturers simply raised the voltage

**Packed with batteries.** This 14.4-volt pack contains 12 individual 1.2-volt batteries. Putting more batteries into the pack boosts the total voltage, but there's a limit before the pack gets too bulky and heavy.



**Smart chargers.** Universal chargers will handle both the new nickel-metal-hydride batteries and the old nickel-cadmium batteries.



to quench the power thirst because upping the voltage is the easiest part of the energy equation to tinker with. A single Ni-Cd battery (or cell) produces only 1.2 volts, so individual batteries are ganged together in series to produce a higher overall output. Six batteries were used in the battery packs of the old, anemic 7.2-volt drills. Eight batteries boosted the output to 9.6 volts, resulting in a tool that actually did some work. Twelve batteries power the 14.4-volt tools (see the bottom photo on the facing page). At some point, though, adding batteries just makes a battery pack, and thus the tool, too heavy and bulky, a common complaint with the current, hefty 18-volt drills.

Another problem is disposal of exhausted batteries from all of those cordless tools. The U.S. government has listed cadmium as a hazardous waste requiring proper disposal (see the related story at right). While handling the battery during use or at the time of disposal poses no problem, once in a landfill, the battery housing deteriorates, releasing the cadmium to leach into the groundwater. If the expired battery is incinerated, fine particles of cadmium are released into the air or collected in the ash. European and Scandinavian countries are making a strong push toward green technology, and eliminating cadmium is high on their agendas. Tool manufacturers, wanting to be part of these markets, are having to respond with batteries containing no cadmium, mercury or lead.

### Ni-MH batteries power consumer electronics

Power-tool manufacturers are looking to Ni-MH battery technology as the next generation of portable power. Ni-MH batteries have a higher energy density than Ni-Cd batteries, and because they do not contain cadmium, mercury or lead, Ni-MH batteries don't need to be recycled. The technology is not new. If you recently purchased a

laptop computer, video recorder or cell phone, chances are it is already equipped with Ni-MH batteries.

Power tools, however, demand more from batteries than home electronic components do. Initially, Ni-MH batteries did not provide acceptable performance for the high current drain and rough service expected for power tools. Recent improvements solved those problems. Like a Ni-Cd battery, the Ni-MH battery produces 1.2 volts for the same size and weight. The difference is that the Ni-MH battery delivers 2.2 amp-hours, a 10% boost in power over current Ni-Cd batteries. Power tools with 3.0 amp-hour batteries should be available by spring of 1999.

### You won't have to replace all of your power tools

Manufacturers have no plans to phase out Ni-Cd batteries, and, in fact, they continue to try to squeeze more power out of them. The new Ni-MH batteries will work with your older power tools because, thankfully, the new batteries are being packaged to fit in the old battery-pack configuration. With Ni-MH batteries, the only difference you'll notice about your cordless tool is longer run time between charging. The downside: A new Ni-MH battery will cost about 20% more than an equivalent Ni-Cd battery, and you will need a new charger. Manufacturers will be offering chargers that are capable of handling either Ni-MH or Ni-Cd batteries. □

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## Recycling nickel-cadmium batteries

Keeping Ni-Cd batteries out of the solid waste stream is the mission of the Rechargeable Battery Recycling Corp. (RBRC). The RBRC is a nonprofit organization founded in 1994 to educate the public about the benefits of recycling. To promote recycling, the RBRC has launched a nationwide campaign, "Charge Up to Recycle!," featuring Richard Karn, Al in TV's *Home Improvement*, as the spokesman. Stores taking part in this campaign will display collection boxes for spent Ni-Cd batteries (see the photo below). To locate a participating store near you, call (800) 8-BATTERY, or visit the RBRC web site at [www.rbrc.com](http://www.rbrc.com). —D.P.

