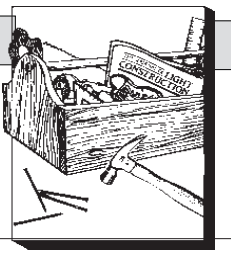

Old Faithfuls

by Clayton DeKorne

Some things are not meant to change. In the modern era of lightweight, electronic tools, three heavy-duty veterans stand out as my favorites: the Skil model 77 saw, the Black & Decker model 1321 drill, and the Porter-Cable model 504 belt sander. These tools were first issued more than 40 years ago and are still available today, virtually unchanged.

They may not be svelte and sexy like the tools adorning the front pages of current tool catalogs. After all, they were designed in the era of the flat-head V-8 and Rosie the Riveter.

But these designs have not just stood the test of time, they continue to be industry standards.

Slow Speed, High Torque

At 9 1/2 pounds, the Black & Decker 1321 1/2-inch drill is all there. You wouldn't want to spend all day with this drill over your head, but my old, all-steel version is great for mixing mud for drywall and powering a 4-inch hole saw.

Most of the weight of this drill is in the front gears which step the 9-amp motor down to 450 rpm. (see Figure 1). This slow speed keeps the mud from splattering, and makes it easier to keep a 4-inch hole saw from jamming and breaking a wrist. But the main advantage of the low rpm is the high torque it permits, which is needed to drill large diameter holes through knotty timber and mixing a lot of heavy mud at one time.

The relationship between torque and rpm is the secret behind all electric tools. Torque has an inverse relationship to rpm: If you lower the rpm of a high-amp motor, you increase the torque. This principle is common to the other tools reviewed here.

The 1321 was first issued in 1938, and it has changed very little. The motor on the 1321 is still hand wound. With improvements in manufacturing technology Black & Decker can now "feed steel and copper in one end of a machine that spits armatures out the other end," according to a Black & Decker spokesman.

But the company has opted to keep producing the hand-wound motor for some industrial tools such as the 1321. The density of copper windings in the armature is maximized with hand winding, which creates a stronger magnetic field and a faster motor. When the drill is then geared down, still with the same amount of power, you get higher and more constant torque at the chuck end.

A couple of things have changed on the 1321, though. Most noticeable is that the drill's large spade handle and the trigger switch are made of plastic instead of steel. This is the result of an Occupational Safety and Health Administration (OSHA) ruling that requires insulated handles on all electric tools.

Other small changes include a slightly higher amp motor (even more windings have been added) to keep the specs on the old drill competitive with newer professional-duty tools. This has required Black & Decker to add a bigger fan to meet Underwriters Laboratory standards.

I picked up my 1321 used for $5. It needed a new cord and while replacing it I took the drill apart to clean it. I discovered the armature had been burned, but I was able to replace it for $40 and about an hour of work. A new 1321 sells for between $175 and $250, which is still competitive with many heavy-duty 1/2-inch drills. If you want a drill that will last a lifetime, you won't be disappointed with 1321.

Figure 1. *The gears in this Black & Decker heavy-duty drill account for much of its weight. The gears create high torque at the drill chuck by stepping down the rpm of the 9-amp motor.*

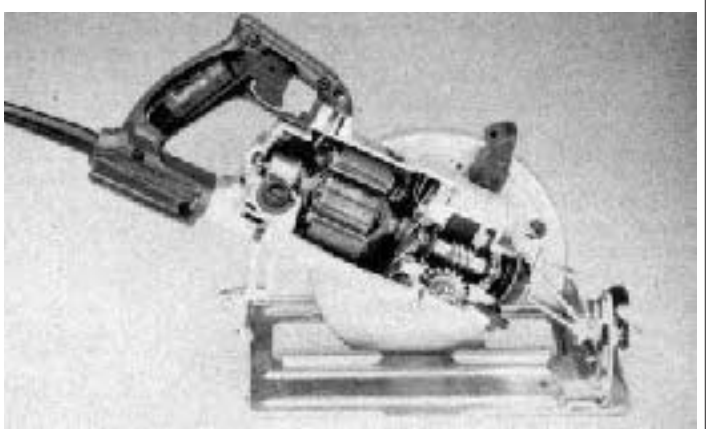

Figure 2. *The Skilsaw model 77 worm drive has been the standard for professional portable circular saws for more than 50 years.*

The Original Skilsaw

The model 77 Skilsaw was first issued in 1937, and the only change since has been a substitution of the original steel handles for plastic ones, as mandated by OSHA.

The 77 has served as the standard of professional-duty saws for over 50 years. In fact, this Skilsaw's former relatives, which it closely resembles, were the first power saws ever made.

The Skilsaw was invented in 1921 by Edmond Michel while, according to corporate legend, he stood in a field in Louisiana trying to think of a better way to harvest sugar cane. Michel reportedly produced a motorized machete. No one will say whether it worked or not, only, "he thought it might work better if the blade rotated."

Michel's eventual design, which evolved into the model 77, was a worm-drive saw. Unlike a "sidewinder" with a motor that runs perpendicular to the blade, the motor of a worm-drive runs parallel to the blade. Power is transferred from this in-line position to turn the blade by means of a worm gear at the end of the armature shaft (see Figure 2).

The primary function of the worm gear is not just to keep the saw streamlined, but to transfer more power and to last longer. The teeth on a worm gear are a continuous spiral like the threads of a screw. This gear configuration wears better and is much stronger than straight-cut gears whose teeth can snap when a saw is pushed too hard through a knot or into a nail.

All electric saws are geared down to increase torque. With a worm gear, it takes many turns of the armature shaft on the motor to spin the arbor shaft at the blade just once. The arbor speed of the model 77 saw is relatively slow — about 4,400 rpm — much less than the typical sidewinder. With the heavy-duty, 13-amp motor of the 77, this provides high torque that doesn't bog down. The model 77 can be pushed hard through green lumber and will easily survive the binding caused by unsupported crosscuts — typical abuses of a professional framer's saw. For this reason, and because worm-drives tend to last a long time, these saws are preferred for heavy-duty use.

But while a worm-drive configuration produces high torque, it is inefficient, from a mechanical point of view. The oblique meshing of the gears produces a lot of friction and heat. Consequently, worm gears are made of bronze (a relatively soft metal) which is inherently more slippery, and the gears must be immersed in an oil bath. Periodically changing the oil, however, reduces the potential for problems. Whenever I change the oil in my saw, I first run the saw for a few minutes with a reservoir full of kerosene. This cleans out any buildup of sawdust and pitch in the gear housing.

The model 77 is a 7 1/4 inch saw which sells for about $150. Other worm-drive saws are available in 8 1/4 and 6 1/2 inch sizes. But regardless of size or make, all worm-drives are commonly called Skilsaws, even when they aren't made by Skil. And often they are even referred to as

Figure 3. *The Porter-Cable 504 portable belt sander was dubbed the "Take-About" in 1945 when it was introduced.*

"77s," a tribute to Skil's design.

I've owned a "77" for over ten years; it was made by Skil but marketed by Sears Roebuck and Co. in its industrial line. I've replaced the motor once. The failure was due to not changing the brushes. Several framers have reported that they go through motors in their worm-drives in about a year, regardless of the condition of the brushes. But these guys are undaunted. The design is so simple and familiar that they tear down their "77s" on site to replace the motor. And, they claim, any other saw would burn up in a month.

Take-About Sander

Though not a mainstream builder's tool, a belt sander earns its keep with most finish carpenters and remodelers. If you opt for a belt sander, you won't go wrong with the Porter-Cable model 504. You may have eyed its porky frame in the catalog and decided it was probably more than you needed. The shape of the tool resembles an electric locomotive. It looks indestructible, and it very well might be.

The model 504 was first issued in 1945 as the model A-3 sander. By the company's standard at the time, it was light and zippy, perhaps, even novel. The company's early big sellers had been stationary sanders, drum-type floor sanders, metal lathes, and milling machines. The A-3, on the other hand, weighing in at 15½ pounds, was dubbed the "Take-About" sander. It sported the first die-cast aluminum housing and the first plastic handle with a trigger switch on a Porter-Cable tool.

Today the model 504 is the heaviest portable belt sander on the market. But for this reason, I think, it is one of the easiest to use. The weight is evenly distributed over the belt. You can let the tool do the work for you, without bearing down. This allows you to avoid the dips and gouges from uneven pressure.

The 504 is a worm-drive sander, similar to the Skilsaw and needs to be oiled periodically. The same procedure for cleaning dust out of the oil reservoir should be followed. Since the motor sits over the belt, power is transferred downwards by a drive chain (see Figure 3). The chain also has to be lubricated with grease packed in the chain case. Porter-Cable insists you use "Porter-Cable Special Grease" but a #2 wheel bearing grease will work as well.

I first encountered the A-3 in my grandfather's workshop. He bought the tool in 1970 when Porter-Cable, then in Syracuse, N.Y., was a "local company" for him. Twenty years later, the machine seemed worn out. Most of my grandfather's work — from houses to cabinets — started as rough timber, so the old Take-About got a work out.

The tool's simple design and grandfather's can-do approach to everything, prompted him to take the sander apart and find out what was wrong. Some guards and the drive chain were worn, so he wrote to the company, now based in Jackson, Tenn. A reply came back complete with the parts.

The model 504 sander sells for between $350 and $500. Besides being the heaviest, the easiest to use, and possibly the most durable, this price also makes the 504 the most expensive portable belt sander. I guess you get what you pay for. ■