Necessity Is the Mother of Invention

by Marc Shapiro

A few years ago, a co-worker and I were trimming out an 1893 townhouse in Washington, D.C.'s tony Georgetown neighborhood. On this high-end job, all the joints had to be tight and the miters perfect. The job got me thinking about better ways to measure angles, especially inside and outside corners. Eventually, after some tinkering, I came up with an easy-to-use protractor that I thought worked better than any other — but if you think having one really good idea is an easy way to fame and fortune, keep on reading.

Slow Going

While we worked on the Georgetown project, I was troubled by the slow process of measuring the corners with a T-bevel and protractor, converting the measurements to a saw setting, and making trial cuts. I wanted a better measuring tool.

So, one night after work, I started fooling around with some toilet-paper tubes, shirt boxes, and Scotch tape. I began imagining a possible solution: two pivoting legs with graduated degree marks at their axis. I built several generations of wood prototypes. My goal was to create the perfect tool for measuring angles. I wanted it to give the saw setting for miter cuts automatically and I wanted it to have legs longer than those of a traditional T-bevel, for greater accuracy.

After a few tries, I had finally designed the right tool for the job. It had only one moving part. It required no calculations; it automatically corrected for the peculiar layout of all miter saws, in which the miter-saw scale reads zero degrees when the saw is set for a 90-degree cut. I hired a local machine shop to make an aluminum-alloy prototype to my final specifications.

Patenting and Licensing

The next step was getting a patent attorney so I could protect my invention. Through friends, I found a good attorney to prepare the patent application and guide me through the process. Several searches indicated that I had a valid patent claim. After more than two years of hard work, the U.S. Patent Office granted my patent. I was jubilant.

But a patented idea is only that: an idea. I still needed to license my tool to a manufacturer. As it turns out, the world does *not* beat a path to your door if you build a better protractor, so I had to beat my own path. Some companies did not share my vision, but The L.S. Starrett Company, which has been making precision measuring tools in Massachusetts since 1880, was interested. In the fall of 2002, we negotiated a licensing agreement.

Realities and Rewards

Much of my time is now spent promoting my invention, but I'm still working about half-time as a carpenter. The costs of patenting and developing are significant. Though I have done all of my own patent drawings and assisted my attorney in many cost-cutting ways, my costs to date exceed $20,000. I have spent a tremendous amount of time dealing with the development, patenting, licensing, and marketing aspects of my invention.

The ProSite Protractor (my tool!) has gotten several favorable reviews in construction and woodworking magazines. And, at this year's American Hardware Manufacturers Association Hardware Show in Chicago, it received an Editor's Choice Award from *Popular Mechanics* magazine. I just wish I had had it for that trim job in Georgetown.

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ALL PHOTOS BY DREW ARNOLD

The inconvenience of using a bevel and protractor on an elaborate trim job compelled the author to come up with a better method to measure inside and outside corners. The ProSite Protractor not only measures the angle, it gives the correct miter setting for the saw.

Starting out with cardboard and Scotch tape, the author gradually developed his design, eventually moving on to wood and finally an aluminum prototype made by a local machine shop. The tool is now manufactured by Starrett and sells for about $40.

Toolbox

LASERS AND LEVELS

Long-Range Framing Square. If you're looking for an easy-to-use tool that can help with squaring room additions and decks or laying out tile, check out the *FR-16 Laser Square*. This unique device combines a conventional-looking aluminum framing square with a pair of lasers. The lasers expand the square's effective length to 150 feet indoors and 80 feet outdoors and can be easily adjusted if they're knocked out of square, says the manufacturer. The tool sells for about $90.

Laser Products, 877/679-1300, www.lasersquare.com.

Versatile Compact Laser. Self-leveling rotary lasers are often the preferred tool for leveling large exterior projects. But unless you're an excavation or foundation contractor, most jobs don't require such an expensive and complex tool. Instead, consider Pacific Laser System's newest compact laser, the *PLS2E,* which includes an electronic detector (Model LD) that extends the laser's range to 100 feet. With the detector, you can use the tool outside for common tasks like leveling mud sills, decks, and siding, and for sloping gutters and walkways. The PLS2E generates both vertical and horizontal laser lines; its base is threaded for mounting on a camera tripod or on the magnetic wall bracket that comes with the tool. With the detector, magnetic wall bracket, and case, the PLS2E sells for $495 — about half the cost of a self-leveling rotary laser.

PLS, 800/601-4500, www.plslaser.com.

All-Weather Rotary Laser. Working in rain and snow and in extreme heat and cold is a reality of the construction industry, so it's important that your tools are durable and weatherproof. Not only can Trimble's *LL300 Spectra Precision Laser Level* stand up to the elements, says the maker, but it can survive a three-foot drop onto concrete. It has an out-of-level warning and will operate for about 90 hours on four D alkaline batteries. The self-leveling laser is complemented by two Trimble receivers: the *HR300* ($195), which is designed for both hand-held and rod-mounted uses and is suitable for general leveling tasks; and the longer-range *CR600* ($695), which can be equipment-mounted and has seven sensitivity ranges, from 1 inch (machine course) to .004 inch (ultrafine). The suggested price on the LL300 is $925.

Trimble, 800/538-7800, www.trimble.com.

Easy-Read Level. Accurate spirit levels require a bubble that's easy to see and a rugged housing that won't bend or distort. While levels have improved greatly over the years, most efforts have focused on improving the durability of housings and the quality of materials. Comparatively little effort, I think, has gone into making the vials easier to see. Empire says the levels in its new *True Blue* line are easier to view in all lighting conditions. The vials use blue cylinders and a pair of dark rings on the ends to increase contrast, making the bubble easier to spot. The line includes everything from magnetic torpedo levels ($8) to extendable layout levels that stretch from $6\frac{1}{2}$ to 10 feet ($189).

Empire Level, 800/558-0722, www.empirelevel.com.

SAW BLADES

Two Tooth Sizes. With conventional saw blades, users often must choose between speed and quality of cut. Blades with fewer teeth cut fast but rough. Blades with more teeth produce cleaner cuts, but they cut slower and put a greater strain on the saw. Porter-Cable is promising the best of both worlds with its new *Razor Variable Tooth Carbide* saw blades. These thin-kerf blades — which combine small and large teeth and have C3 carbide tips — increase cutting speed, produce cleaner edges, last longer, and make less noise than conventional blades, Porter-Cable says. They come in 7 1/4-, 10-, and 12-inch sizes for circular, table, and miter saws. The 7 1/4-inch blades start at about $10; 10-inch versions start at about $30.

Porter-Cable, 800/487-8665, www.porter-cable.com.

Smooth Operator. Paying $100 or more for a saw blade may be a tough pill to swallow, but I've never talked to anyone who's regretted buying one of Forrest's *Woodworker II* blades. Available in sizes from 4 3/8 to 12 inches, the Woodworker II uses C4 carbide and 15-degree ATB (alternate top bevel) teeth to produce both rips and crosscuts that are smooth enough for a glue joint without sanding or jointing. According to the manufacturer, the blade works well with most materials, including veneer plywood, one-sided laminates, hardwoods, and softwoods. The 10-inch, 40-tooth model with a 1/8-inch kerf (W21024) sells for about $120.

Forrest Manufacturing, 800/733-7111, www.stores.yahoo.com/forrestman.

Go the Distance. Marathon circular-saw blades are popular with professional users for two simple reasons: They work well and they're a good value. Recent additions to the line include an improved *Marathon Deck Blade* and *Marathon Blades for Cordless Saws*. The new deck blade has a special coating to prevent pitch buildup when cutting resinous, pressure-treated lumber. The cordless saw blades, sold in sizes from 3 3/8 to 7 1/4 inches, have ultrathin kerfs and an aggressive hook angle, which the maker says help deliver more cuts per charge than other cordless blades. The deck blade sells for about $15; the cordless blades range in price from $10 to $20.

Irwin, 800/464-7946, www.irwin.com.

Shim-Free Dado Set. If fussing with the shims on your stacked dado set is cutting into your productivity, try Freud's new *Dial-A-Width Dado Set*. Instead of various shims, the cutter uses a dial hub that adjusts the dado thickness .004 inch with every click. The set cuts dadoes from 1/4 to a little over 7/8 inch. As far as I'm concerned, the coolest part of the new design is the ability to fine-tune the dado thickness without pulling the cutters off the saw arbor. The set includes two 24-tooth 8-inch outside blades, five chippers, a wrench, and a carrying case. It works with both right- and left-handed table saws and sells for about $250.

Freud, 800/334-4107, www.freudtools.com.

Porter-Cable High-Pressure Nailer

by Tim Uhler

I run a framing crew in Washington state. Because I've already tested one high-pressure nailing system ("Max PowerLite High-Pressure Nailer," 6/04), *JLC* asked me recently to take a look at another — Porter-Cable's new CLFCP350 high-pressure framing nailer combo kit. The set consists of a clipped-head framing gun, a 50-foot air hose, and a 175-psi stacked-tank compressor. Increasing the air pressure allowed the manufacturer to decrease the size and weight of the gun; Porter-Cable says the smaller, lighter tool reduces fatigue and makes it easier for framers to do their work.

FCP350 Nailer

At 6.5 pounds, the nailer weighs about 1.5 pounds less than the company's other clipped-head guns — but it still has plenty of driving power. The FCP350 shoots 30- to 34-degree clipped or offset round-head fasteners. Around here, we normally shoot 20- to 22-degree full round-head nails; Porter-Cable says a full round-head version of this gun will soon be available.

Although I happen to prefer top-loading magazines, the rear-loading magazine on the FCP350 did not present any problems. The depth-of-drive mechanism is activated by a knurled knob on the nose and works very well. A little dial on the trigger allows you to switch between sequential and bump-fire modes.

One of my favorite things about this gun is how easy it is to clear jams. If a nail gets stuck, all you have to do is loosen a knob on the handle and pull the magazine away from the nosepiece.

The gun operates like any other stick nailer. It accepts fasteners up to 3 1/2 inches long and .131 inch in diameter. The manufacturer recommends using the lowest pressure setting that will consistently set the nails. Depending on the size of the nail, that could be anywhere from 80 to 150 psi.

Compressor

Porter-Cable's high-pressure compressor looks very similar to its other stacked-tank models. Everything about the compressor looks and feels well made. The tanks hold 4.3 gallons and the oil-lubed pump can deliver 4.4 cfm at 90 psi. According to the manufacturer, the pump cuts in at 150 psi and cuts out at 175 psi.

One concern we had about the gun was that the compressor was kicking in all the time. It didn't matter what size nails we used or where the pressure was set, the compressor seemed to come on about every seven nails. The whole crew noticed, and found it annoying. I couldn't help wondering if the constant cycling of the compressor would make it wear out sooner.

I don't know how many nails other guns can shoot before the compressor comes on. All I can say is that I have never noticed our regular eight-gallon 120 psi compressor kicking on and off so frequently, even when we run three or four framing guns. And we never noticed the problem when we tested the Max nailer.

Hose and Fitting

The kit comes with a 50-foot-long, 3/8-inch vinyl rubber hose and includes pipe-joint tape and fittings. The hose seemed well made and durable. (We normally use 1/4-inch hoses, so the 3/8-inch hose did feel bulky and heavy.)

The compressor is equipped with two universal quick-connect air fittings that will accept various types of 3/8-inch plugs. If your regular guns have 3/8-inch fittings, someone on your crew could accidentally connect them to this compressor when it's putting out 150 psi. You can dial the pressure down and use the compressor with standard guns, but it's an either/or deal: There's only one air regulator, so you can't run high-pressure and low-pressure guns at the same time. (The compressor for Max's high-pressure system is expensive, but it does come with dual regulators, so you can run high- and low-pressure guns simultaneously.)

The Verdict

Porter-Cable's high-pressure nailing system is a nice setup, but I like the gun a lot more than the compressor that goes with it. By itself, the gun is very appealing. It seems durable and operates well. The depth-of-drive was consistent and easy to set and the nosepiece's aggressive teeth are good for toe-nailing. The exhaust cap is tool-free and swivels 360 degrees.

Except for the 175-psi pressure rating, the compressor resembles many of the other dual-tank models on the market. It's not particularly loud or heavy and it seems well made. But it runs too often with the high-pressure gun.

I would have been more impressed with Porter-Cable's high-pressure system if I hadn't already been familiar with Max's. Max uses a coil nailer, which holds a lot more nails than Porter-Cable's stick gun. And there's not much of a weight penalty for this; the Max gun is more than a pound lighter than the Porter-Cable. Max's nailer also uses a thin, light hose, and the compressor is smaller and quieter than the Porter-Cable.

The problem with Max's system is the price — around $2,000 for a gun, compressor, and hose. Porter-Cable's kit, by contrast, costs about $650. At that price, the tool would look pretty good if I didn't already own a bunch of conventional nail guns. But as it is, the kit just isn't enough of an improvement to make me want to switch over from the conventional guns and compressor I'm using now.

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