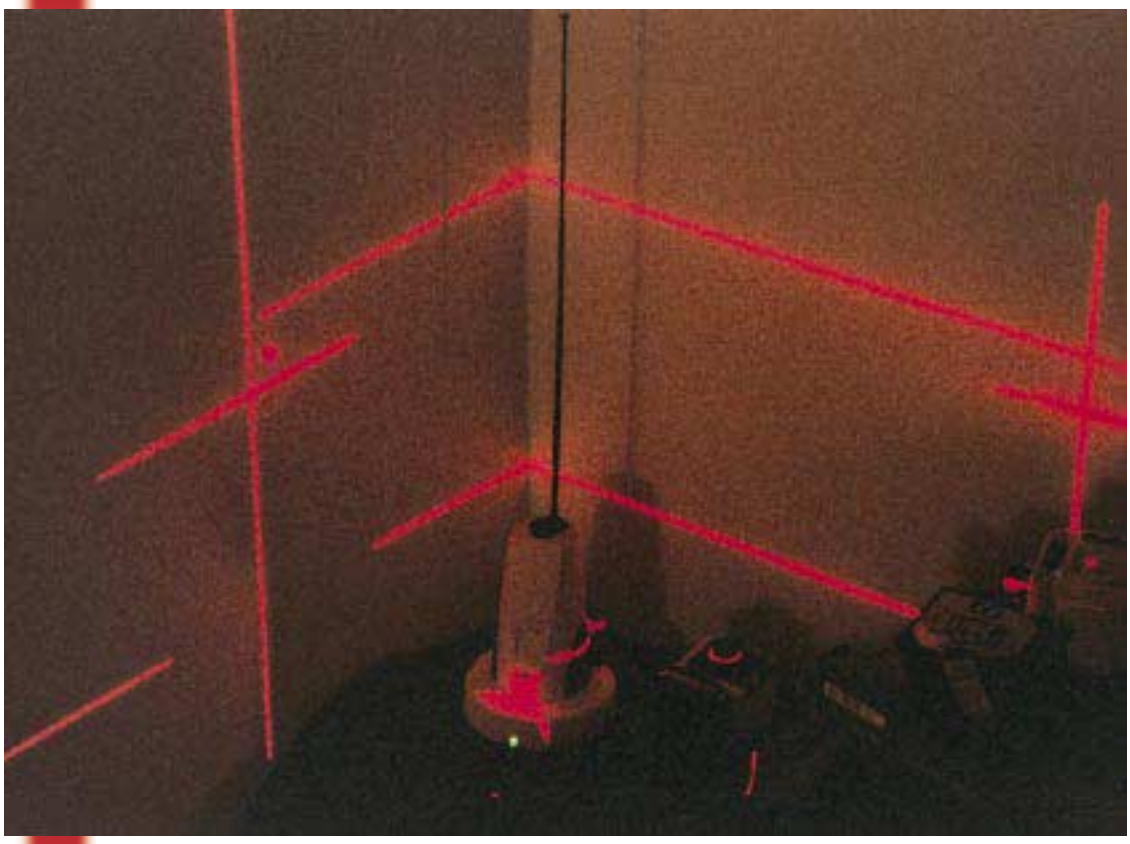
Shedding Light on LASERS

Small lasers packaged in compact "boxes" hold more promise than the point-and-shoot stick variety



Look before you buy. No construction laser will give you a line through space, and only a few will give you an actual line on the surface of wall or floor. The lines shown here come from the Laser Square SL-24 and Momentum Laser DP 90. Most lasers, however, project a single dot.

by Clayton DeKorne

Pick up nearly any tool catalog or trade magazine and you'll find a slew of "construction lasers" that claim to provide an efficient alternative to traditional layout methods. To be sure, laser technology holds great promise for the building trades, but this industry is still young. Many of the products available today may not prove as practical as you might first expect.

A Spectrum of Lasers

The commercial and industrial trades have been using lasers for years. Although the technology has changed in the last decade, the performance of these tools has been well established.

In the residential trades, however, the advantage of a laser is not so obvious. Nevertheless, scores of manufacturers have recently mobilized to deliver low-power visible lasers in small, relatively inexpen-

sive packages.

For safety, the power output of any laser must be limited. Federal regulations set minimums for construction lasers at less than 1 milliwatt (Class II), and less than 5 milliwatts (Class IIIa). Even the brighter Class IIIa laser is safe for your eyes, as long as you don't stare straight into the beam for a long time. But this low power rating also means that the beam isn't very bright, and in strong sunlight, all of these lasers are very difficult to spot outdoors.

Figure 1. Square dots. Though not much bigger than a tape measure, and nearly as durable, the Tri-Lite has won fans in the commercial interiors market for quickly plumbing steel partitions. The unit is self-leveling and accurate for distances under 50 feet.

Figure 2. Plumb, level, square. Accurate to 1/8 inch over 100 feet, the self-leveling PLS5 is one of the most exact instruments among the new breed of lasers. It has two plumb beams (one up and one down) and three level beams (at 90 degrees to each other), so you can accurately mark both ends of every layout line.

Dot Lasers

A "dot laser" is essentially a laser diode mounted on a level rail. Regardless of what some advertising photos show, these instruments project a dot, not a continuous beam; to be visible, the output of the laser must reflect off a target. Unless your site is shrouded in fog, you won't see a continuous reference line shining through the air.

Accuracy for these instruments is defined by the speed of the vial and by two alignments — one between the bubble and the rail, the other between the rail and the laser beam. Check the manufacturer's specs carefully. Too often only one alignment, that between laser and rail, is given as the measure of accuracy. But the accuracy of an instrument is only as good as its weakest link, and on a dot laser, this link is usually the sensitivity of the vial. A 5-arc-minute vial works fine on a 4- or 8-foot stick. Project that line out 100 feet, however, and you could have an error of up to 3 inches. For accurate marks at longer distances, you need leveling accuracies measured in arc-*seconds*.

If you work with shorter distances, you must still keep in mind that a dot laser by itself can only project one dot in one direction. How often you have to set up to level a longer run will determine whether this type of laser is useful to your work. If you have to turn the corner and expect to keep your elevation, you'll have to put up more cash for accessories — namely, a swivel base or a beam splitter.

Most swivel bases rely on bubble vials, which add another layer of inaccuracy to the equation. And for every elevation you run, you have to level the base, then level the instrument. If you change elevations, then change back, you double the chances of getting an inaccurate reading. This leveling procedure reduces the dependability of these instruments to establish accurate repeat elevations. And the time you spend leveling the base and instrument seriously cuts into any labor savings.

A beam splitter typically uses some form of prism to divide the beam — at 90 degrees, or at 180 degrees (90 degrees left and right). A few companies also offer a line lens, which spreads the beam into a line. The most versatile of these accessory "systems" comes from CheckPoint Laser. While you still have to deal with all kinds of extra parts, CheckPoint has packaged them in a job-site-friendly kit filled with a well-designed family of tools. The basic level — a 1-foot-long, 1x2-inch rail milled to within .002 inch — has been machined so that all sides of the rail can be used as references. All the relevant dimensions and centerlines have been carefully scribed on the tools. Perhaps the most ingenious feature is a protractor dial, complete with detents at common angles, for accurately projecting angles, either parallel or perpendicular to the instrument. Success with this tool will depend on how committed you are to learning new tricks. To get the full benefit of all its features, you almost have to become a student of the tool, much the way some folks have done with Construction Master feet-inch calculators.

Square Dots

LeveLite Technologies and Pacific Laser Systems incorporate beam splitting inside self-leveling instruments that provide several dots aligned at right angles. LeveLite makes two models — the SLX2 and the Tri-Lite. The SLX2 shoots two dots at 90 degrees to each other. The top-of-the-line Tri-Lite adds a third dot for plumb (see Figure 1). Pacific Laser's PLS5 adds two more dots — one per-

pendicular to the plumb line in front, and another plumb line below the instrument (Figure 2).

Because these instruments are self-leveling, setup is fast and dependable. The diode swings on the pendulum, allowing gravity to establish level. Provided the diode stays square to the pendulum, this bypasses the inaccuracies of a bubble vial.

The LeveLite tools (also sold in the Hilti and Quadriga lines) are accurate to within about 1/4 inch in 60 feet; the PLS5 is accurate to a much higher degree — 1/8 inch in 100 feet. In this category, it seems, you get what you pay for. The SLX2 retails for about $500; the Tri-Lite goes for about $700; and Pacific Laser's PLS5 sells for close to $1,000.

While this may sound like a lot of money to pay for a layout tool, it can make economic sense. According to Oakland remodeler Jonathan Dougall, the PLS5 has easily paid for itself several times over. "I never hesitate to buy new tools to save labor," Dougall explains. "In the work we do — upper-level house remodeling — we use the PLS5 all the time. The existing floor is never level, but everything above that — windows, trim, cabinets, and ceilings — must be dead on." Dougall used to use a transit for this work (and still does for most exterior layout). "I've owned a couple of [stick] lasers, too, but I don't use them anymore." For Dougall, the reliable self-leveling PLS5 offers a tangible time savings without sacrificing precision. A big part of this savings, claims Dougall, is in its being easy to use. Just set it down and wait a few seconds for the dot to settle out. There's almost no training involved for the crew.

The plumb beams on the PLS5 and Tri-Lite are frequently employed for plumbing tall walls, and for setting the location of can lights in cathedral ceilings. Speeding up these applications alone can go a long way towards paying off the instrument. Dougall and other West Coast contractors note that 9-foot plate heights and vaulted interiors have become quasi-standard in upper-end residences, and lasers can speed this layout.

With its multiple reference points, the PLS5 offers the fastest alignment. In each reference plane, you get two dots that define one straight line. Dougall and other PLS5 users emphasize that these multiple reference points offer immediate and reliable checks. With other instruments, you are beholden to the level or plumb accuracy of the instrument, and you never have a concrete visual reference point for perfect alignment.

Square Lines

As a flooring contractor in northern Illinois, Dan Lewis long ago recognized that an easy-to-use laser device could substantially speed the installation of tile, carpet, and sheet goods. For this type of work, Lewis needed a tool that would show clear layout lines, not just a couple of abstract dots. His answer is the $650 Laser Square — a simple instrument with two laser diodes aligned at a perfect right angle (Figure 3). Switchable optics make it possible to project three different patterns — two dots, two horizontal lines, or two vertical lines. For floor layouts, the vertical lines prove the most useful. When projected low to the floor, these vertical lines show up on the deck as two solid lines of bright light. Whether you're aligning wall plates, a tile grid, or a countertop, having a solid line to sight along speeds the task considerably.

Solidly encased in a heavy powder-coated aluminum body, the Laser Square seems built to last. This is one instrument you won't hesitate to throw in a toolbox. Its ability to level is limited by two bubble vials. While this would work well for leveling a short run of kitchen cabinets, the real advantage of this instrument is in

Figure 3. Square lines. More of a layout tool than a long-distance leveling tool, the Laser Square gives you visible lines at a right angle. For some layout jobs, such as laying out floor tile or leveling a countertop, it's more useful to have actual lines to sight along than a single reference dot.

Figure 4. Rotary level. A visible laser beam becomes nearly invisible in bright sunlight. So rotary lasers made for exterior layout typically include an electronic detector — a small box that clamps to the measuring rod. The detector converts a signal from a sensor (similar to a photo cell) into an LED light display. The sensors have been tuned to absorb light of a specific wavelength, so they can "see" the laser beam in all exterior conditions.

establishing square reference lines.

According to several tile installers, the Laser Square gives them an exact picture of the reference lines they need. "This is a no-brainer," tile installer Todd Schwartz of Akron, Ohio, explains. "The Laser Square is obvious to any floor mechanic who picks it up." Michael Byrne, director of the Ceramic Tile Education Foundation, echoes this claim. "If an installer doesn't understand the Laser Square, he or she needs training in the basic principles of layout. The Laser Square just makes these lines easier to see and quicker to establish. You can do the same thing with a chalk line and tape measure, though perhaps not as quickly."

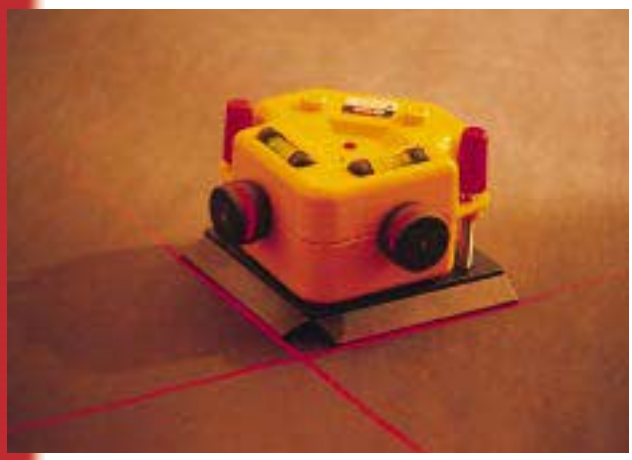


Figure 5. Rotary square. The Momentum DP 90 features two rotating diodes positioned at right angles. These project visible right-angle lines on the floor, as shown, as well as on the ceiling and walls.

Figure 6. Moveable dot. The single laser dot emitted by a self-leveling RoboLaser can be moved to any position with a hand-held remote. While the machine turns slowly, the dot tends to be much easier to locate than the dim line made by the spinning dot from a rotary machine.

Rotary Lasers

Rotary lasers are certainly nothing new in the building trades. Now built with laser diodes, these instruments have gotten much more affordable, but they are still more appropriate for production interior work. Commercial drywall and ceiling contractors represent the biggest market for the latest rotary lasers.

Most rotary lasers have a fixed diode that projects its beam straight up, while an angled mirror directs the beam horizontally. When this mirror spins, the moving dot appears as a line in a circle around the instrument. The light energy becomes dispersed along the line, so it's much dimmer than when all of that energy is concentrated in one dot. For this reason, low-end rotary lasers aren't bright enough for exterior work without an electronic detector (Figure 4, previous page). Some rotary models split the beam so half of it shines straight up. While this further decreases the visual brilliance of the beams, it provides a useful plumb reference for interior work. A few rotary models also feature a "sweep mode" (also called "dithering"). Here, the laser oscillates back and forth, projecting the beam in a small arc (about 10 degrees) that shows up as a much brighter but shorter line. Even with sweep mode, however, the only practical way to "see" a rotary laser in bright sunlight is with an electronic receiver.

As with any fixed laser, unless the instrument is self-leveling, you have to level it by hand using bubble vials. Fortunately, many rotary lasers depend on vials of higher quality than you'll find on most dot lasers.

Unless you specialize in commercial interiors, the cost of a conventional rotary laser is hard to justify. At least one company, however — Momentum Lasers of Santa Clara, Calif. — has built a line of affordable and functional rotary lasers that, for the starting price of about $300, begin to make sense for low-volume custom projects.

These machines use a diode mounted directly on a rotating head, which simplifies the optics and makes for a much less fragile machine. The company's original LaserChalkline features two diodes in the rotating head, which doubles the light, creating a much brighter beam. This model has been targeted for the drop-ceiling trade. Two other models have only one diode each. Momentum markets these in kits: The XL, designed for exterior work, comes with a simple electronic detector; the SL is aimed at finish carpenters. To make it more useful when establishing multiple elevations, Momentum offers an optional Laser Slide — a spring-loaded pole that can be set up quickly between ceiling and floor. A moveable bracket holds the laser, and allows for easy repositioning. All of these Momentum lasers have variable-speed rotation.

The newest Momentum laser — the $600 DP 90 — competes directly with the Laser Square. This model has two rotating heads that paint two laser lines at 90 degrees to each other (Figure 5). In this case, the lines extend not only across the floor, but also up each wall and across the ceiling, defining two planes at right angles to each other. The DP 90 has only been introduced recently, but we did locate one commercial installer, Mark Newman of Orange County, Calif., who reports that the DP 90 has worked well for squaring and plumbing metal studs. Because the diodes rotate, the lines are dim in large

interiors. Momentum offers laser-enhancement glasses with red lenses that make the laser lines stand out. While the glasses work, Newman says they cut down general visibility.

Moveable Dot

The RoboLaser could easily be mistaken for a rotary laser (Figure 6). But unlike conventional rotary machines, this one doesn't generate a circumference line. Instead, the single dot can be slowly rotated, using a hand-held remote control. Because the beam doesn't rotate, it tends to be much brighter outdoors, though still difficult to find in direct sun.

Of all the low-end lasers out there, the $300 RoboLaser lends itself best to traditional layout methods for exterior work. It's self-leveling, so setup is fast. And it's accurate to within 1/4 inch over 100 feet, so it can be used reliably over long distances. The unit can be mounted on a tripod at a safe distance from the scurry of workers and machines on site, and the laser dot can be moved using the remote control to establish multiple reference points.

Beyond Marketing

Choosing the right laser layout tool begins with seeing through the marketing hype. Manufacturers want to appeal to the pros, and with good reason. The use of light beams to establish accurate line and angle projections has obvious advantages in the trades, and even many of the current designs can be extremely useful at speeding up some layout jobs. Yet many advertising campaigns aimed at the trades want us to believe that a particular laser will replace our levels, string lines, plumb bobs, even tape measures. Lasers do have a place in the trade, and their use will grow as manufacturers refine the technology and as tradespeople become familiar with their features. But string lines and tape measures aren't going out of style anytime soon.

Choosing a laser may also mean having to rethink not only our expectations, but how we do the work. Many laser tools have proven cost-effective for some contractors. Most of the satisfied buyers we've found in the trades have enough repeat production layout to see a quick return in labor savings. Not surprisingly, many of these buyers work on larger-scale commercial interiors. But even among custom-residential users, the decision to buy was based on an expected improvement in production, and was weighed against both the price tag of the tool and how much retraining would be required. In most cases, satisfaction also required some creative insight on the part of the contractor and the crew to find the best way to approach the job with a laser.

***Clayton DeKorne** is senior editor at the* Journal of Light Construction.

Sources of Supply

CheckPoint
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Dot and rotary lasers

David White
P.O. Box 1007
Germantown, WI 53022
800/732-5478
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Tulsa, OK 74121
800/879-8000
Full line of dot, square & rotary lasers

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Romeoville, IL 60446
630/679-1300
Square-line lasers

Laser Reference
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Campbell, CA 95008
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Rotary lasers

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Suite 401
Little Rock, AR 72206
501/562-0900
Dot and rotary lasers

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Square dot lasers

Macklanburg-Duncan
4041 N. Santa Fe
Oklahoma City, OK 73118
405/528-4411
Dot lasers

Momentum Laser, Inc.
3285 Scott Blvd.
Santa Clara, CA 95054
800/495-2737
Rotary lasers

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449 Coloma Street
Sausalito, CA 94965
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Dot lasers

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