Laser Levels For Small Builders

by Clayton DeKorne

In 1988, Toshiba produced the first commercially available visible-light laser diode, a breakthrough that was widely expected to improve the quality and lower the cost of construction lasers. Several companies were launched to manufacture inexpensive battery-operated laser levels, but only one, Laser Tools Co. (12221 Arch Street Pike, Little Rock, AR 72206; 501/888-8831), is still in the business. (Emerging Technologies, also of Little Rock, has discontinued making laser levels but continues to make laser gun sights, and T6 Tools, of Chapel Hill, N.C., has disappeared.) I've had two of Laser Tools' small, high-tech levels for several months. Here's what I've learned.

What's in a Laser?

Before laser diodes, most of the big laser transits used expensive He-Ne (or "heenie") tube lasers. These have a fragile sealed glass tube filled with helium-neon (He-Ne) gas. To fire the laser, an electrical current is applied to an electrode inside the tube. The current "excites" the helium-neon atoms and prompts the release of light energy. This, in turn, excites more atoms in the tube, until the light is powerful enough to project from the tube. The light is then focused with optical lenses into a single beam — a laser beam.

Essentially the same thing happens inside a laser diode. However, the "lasing" medium is not He-Ne gas, but a tiny semiconductor chip that is about the size of a quarter grain of salt. The chip is so small that it is very sensitive to static charges and to the heat produced as the light builds inside the diode. To draw heat away, the chip is mounted on a small gold pedestal and the diode is installed in a heat sink — a block of aluminum — inside the level. Manufacturers must take elaborate precautions when handling the diodes to shield them from static charges, and the power circuit must be designed to avoid any surges or gaps that could zap the chip.

Despite these manufacturing challenges, diodes have some distinct advantages. He-Ne tube lasers require large, expensive batteries for power and bulky armor to protect the tube, whereas laser diodes use small, off-the-shelf batteries and are much more durable once properly installed inside the level.

Sturdy Package

Laser Tools Co. manufactures a simple, well-built torpedo level with a small laser on one end. Three models are available — the L100, L50, and L25 — which project beams up to 100, 50, and 25 feet, respectively. Only the L100 has plumb vials. The other two models read level only.

According to the manufacturer, Laser Tools are designed to withstand a 10-foot fall. Of course, I had to test this claim. So before dropping the instrument onto a concrete slab, I leveled the instrument and marked the beam on a spot about 50 feet away. To my surprise, the laser sustained the fall without any perceptible damage to the optics or the vials, and both the level and the beam stayed true, hitting the distant mark. A piece of exposed aggregate did dent the aluminum slightly, but the paint — a sturdy powder coat — didn't chip. While the instrument might not be able to withstand this abuse every day, it seems likely to withstand an occasional mishap on the job site.

The vials are factory-set and fixed into place with adhesives, so if they do go out, you have to send the level back to the manufacturer for realignment.

Accuracy

The accuracy of a laser level depends on both the precision of the vial and the alignment of the beam. The L100 and L50 are both built with vials the manufacturer claims are accurate to ± 1/4 inch in 100 feet, and the beam is steered by means of optical lenses to stay parallel with the level base within similar tolerances.

So is the laser beam level? I confirmed the manufacturers' claims for the L100 in two ways — by checking for level against a more accurate instrument and by checking for consistency.

I tested for level by shooting an elevation at 50 feet with a 5-minute optical transit rated at ± 1/8 inch over 100 feet. I then used the transit to position the laser level at the same elevation and projected the beam at my 50-foot mark. In several readings, the laser was never more than 1/8 inch above or below the mark I was sighting with the transit.

It's worth noting that an 1/8-inch difference at 50 feet was hardly visible to my eye when reading the bubble vial on the laser level. This probably means that the vial is as accurate as the manufacturer claims, but it also points out a limitation of the vials themselves. An 1/8-inch difference on the vial of the transit, on the other hand, is very visible. This leads me to believe that the laser level could be greatly improved by using a higher-quality level.

The Laser Tools levels have a built-in laser to project a level line over long distances. The 6-inch L50 (lower left) shoots level only. The 9-inch L100, shown here with optional base and "beam bender," shoots both plumb and level.

I checked for consistency of readings by shooting a level line at 100 feet. The beam spreads out quite a bit at this distance, but the lenses are designed to project a bull's-eye pattern. This makes it easy to locate the center of the beam. In 50 readings, the marks were spread over about 1/2 inch, which translates to the stated accuracy of ± 1/4 inch over 100 feet. While I wouldn't use this instrument for readings at 100 feet, it would be plenty accurate for shorter distances.

Not a Transit

Laser Tools has used the laser diode not to build a better transit, but to produce a better stick level. The laser level is made to extend a level line in one direction, a task that can simplify a number of layout jobs. It is a useful tool for aligning window and door heights, leveling a single run of cabinets, or setting plumbing lines and heating ducts (especially in dark basements and crawlspaces).

The laser level works exceptionally well in place of a string line for masonry work. For example, you can level a corner block, turn the laser on so that it projects along the course, and then set each of the blocks in that course, using a gauge block that hits the laser beam. Similarly, when leveling floors or ceilings in old houses, a level beam can provide a reference to measure from when setting joists or strapping.

Wherever a single level line must be extended, projecting a laser line is much faster than setting up a water level or running strings. However, I have two cautions: First, the laser beam is not bright enough to be easily seen outdoors. The point is visible, but only close up, so you have to track the beam by holding your hand in front of it as you walk out to the point you are trying to locate. This can make outdoor layouts more awkward, but still possible for one person.

Second, because the laser shoots in only one direction, it is not as useful as an optical builders level or transit for layout jobs where you need to locate several points at the same elevation. For example, you can't easily shoot a level line, rotate the level and shoot another line at the exact same elevation for a kitchen full of cabinets or the foundation of a small addition.

An accessory base with four leveling legs is available to help you quickly level the laser. And because the laser can swivel on this base, you might at first be persuaded to think that this transforms the laser into a builders level. But it does not. The base still only levels the instrument in one direction. For an extra $10, Laser Tools will sell you a collimating ring that will allow you to level a flat spin circle, but in the words of the product service bulletin, this is "a bitch to adjust."

Beam Splitter

While the laser level may not be the best tool to *level* a foundation, with the addition of an accessory "beam bender," the laser can become a useful *layout* tool. This device fits onto the laser end of the level and uses mirrors to split the beam at a perfect 90-degree angle. I checked the accuracy of the angle by measuring diagonals and found the angle to be exceptionally accurate. In fact, I trust it more than pulling a tape. The device rotates, so you can project a right angle in all directions. This allows you to quickly lay out the corners of a small foundation, for example. First, you locate a point on a corner stake below the level, and then rotate the beam bender. The two beams — the one shining straight ahead and the beam that rotates at a right angle to it — will mark the other two stakes.

One caution here: Only the beam shining straight ahead will be level. The second beam will be at an exact angle from the first beam, but not necessarily at the same elevation.

Cost

Laser Tool levels are still pretty costly for what they offer. The L100 is priced at about $300, the L50 at about $200, and the newest L25 at $100. The leveling base costs an additional $70 and the beam bender about $75. This makes the cost for a complete package with the L100 about $450, roughly the same as a good-quality transit package including tripod and measuring rod. Until the price comes down, laser levels remain an "iffy" proposition for small builders. You'll have to weigh the high cost against the advantages: You're buying a well-made tool that allows one worker to easily sight a level line over a long distance, and with the beam bender, you can very quickly lay out 90-degree corners. ■