

How laser leveling works

BY CHRIS HARRISON

Everyone promises to do his or her "level best" on any job, but with laser-guided equipment, the term takes on a whole new meaning.

The technology behind it is complex, but the concept and implementation are fairly simple. Basically, laser leveling begins with a 360-degree rotating laser that allows the operator to set "falls" or slopes, either to plan or to client specifications.

As the laser spins, it creates a plane and sends signals to the receiver that is located on a mast attached to the blade. This then sends an electrical signal to the computerized controls on the blade. These signals control a valve that moves the blade up and down. This blade movement moves material from high spots to low spots to achieve the level required.

By adjusting the speed of the blade movement, tighter tolerances are achieved.

"Our grading systems work independently from the tractor and adjust to grade automatically," according to Ray Joling with Florida-based Southern Laser & Laser Leveling (www.laserleveling.com). He says all that the operator needs to do is steer the tractor to achieve excellent results.

Technically speaking, there is no difference in the performance between the 3-point hitch and pull-type box blade grading systems.

While the 3-point hitch is more maneuverable than the pull-type box blade (because it is mounted closer to the rear of the tractor) each grading system provides quarter-inch accuracy in the finish grade.

Getting started

While the overall approach for any field is similar, the desired result varies. Baseball and softball fields, with their conical design, usually are designed differently than the run of other sports turf like soccer, football, and comparable areas that generally are crowned in the center.

Even on similar fields, there are significant differences both in control systems and in the manner in which the operator sets up and conducts the leveling process, says Bill Barkshire, owner of Barkshire Laser Leveling, Inc. (info@barkshireleveling.com, San Juan Capistrano, CA).

"One of the reasons laser leveling continues to be a specialized operation is that there are 'right ways' and 'wrong ways' to do the job," he says. He says that many general contractors struggle to achieve the appropriate tolerances because their staff does not understand the fundamentals of laser leveling and the process required.

His company has another advantage over the Yellow Pages dozer operator: Barkshire designed and manufactures the blades they use. "Our systems incorporate the latest laser technology and highly maneuverable equipment resulting in

tight tolerances that meet planner specifications for falls," he says. "Compaction is vital to reduce settling after leveling and integral to our system."

Laser leveling is used at all kinds of sports facilities, from the professional stadium to local ball fields. While it is good to have an expert like Barkshire or Laser Leveling do the finish work, they do not have to be around for the whole job.

"A contractor needs to know what grade has been specified for the field or how an engineer or architect has laid out the field," Joling says.

The most economic approach for a local municipality or college is to have its grounds crew go ahead and do the prep work, says Barkshire. "They typically have the manpower to water, roto-till and loosen the soil," he says.

After the crew has done the basic earthmoving, Barkshire's people would come in, re-grade the surface and do the fine-tuning.

"We work with a lot of park and recreation people that way," Bill says. Although they are willing to do the entire project, having the rec staff work on the job is more efficient. "Typically park and recreation can save a lot of money by doing the basic work themselves," he says.

"Preparation is really a key to timely and quality finishes," he adds.

The professional levelers want all turf areas to be stripped and rototilled to loosen the soil. This is because excess organic materials add to the time for finish and also result in less precise lasering.

Irrigation must be marked and, in most cases, capped or buried.

After that, the equipment takes over. Like most systems, on the jobsite Southern Laser's grading



LaserLeveling's GradeMaster Pro 3 point hitch-grading system.

systems are controlled automatically from a laser transmitter.

The laser is mounted on a tripod and positioned above the ROPS of the tractor. The laser provides a 360-degree plane of light over the entire jobsite as a reference, similar to an airport beacon.

A 360-degree receiver mounted on the box blade sees the laser light and signals the hydraulics on the box blade to raise or lower the cutting edge to stay on grade.

To begin a project, the laser is positioned at any height above the cab of the tractor, Joling explains. The box blade is benched to a starting elevation or desired finish grade and the 360-degree receiver is set to the laser light. From there, the operator has a constant reference to grade and the box blade automatically adjusts to the laser light.

As a rule of thumb, expect to deploy five horsepower for every foot of scraper. For example, a 6-foot scraper will typically require a 30-hp tractor.

Systems like Barkshire's allow for one-man operations. That person is responsible for mobilizing tractor/blade, setting up the laser control equipment and completing the operations.

Where to level

"Because laser leveling is a cost effective operation, all jobs could benefit," Barkshire maintains. As compared to hand-leveled projects, laser-leveled projects

result in longer lasting playing surfaces that are safer and with better drainage, he says.

"With increased demand on fields, clients often focus on playability, keeping their fields in service regardless of weather conditions," Barkshire says.

Experts maintain that laser leveling is particularly critical in new construction where attention to the subgrade, matching profiles, and the finish grade continually result in better products for clients.

"Many of our clients have recently installed new fields that do not offer the playability and conditions they require and schedule our services to correct only a short time after construction," Barkshire says.

Of course, the finished product is only as good as the building material you are working with. Sandy soil is always the preferred choice.

Joling says their laser grading systems are well suited for most jobsite applications. "However, our box blades are designed to be a finished grading system. The material must be loose and able to be moved about."

Like Barkshire, they recommend that the material be rotovated and loosened to a depth of 4-6 inches.

"Our system will grade sandy soil as well as clay. However, it will not work in turf areas," Joling says.

Barkshire notes that many clients with clay soils get satisfactory results by incor-



LaserLeveling's Skidmaster HC skid-steer grading system, designed for use on the hardest of materials.

porating amendments or by bringing in finish materials to achieve tighter finishes.

If amendments are to be added, it is best to incorporate them during rototilling. Added materials should be spread across the area to be lasered and water must be available during and after the process to ensure the compaction process.

"Both turf areas and infields benefit from a laser-leveled finish, but due to the obvious increased play in the infield, that area is critical," he adds.

Quashing a rumor

One persistent rumor is that cell phones or other radios will interfere with the leveling process.

"Cell phones do not interfere with our operations," Barkshire says. However, he says that other lasers working in a construction area can interfere, as can glare and reflecting light.

Joling agrees. "Lasers are light based," he says, "so they do require line of sight between the transmitter and 360-degree receiver."


Given those parameters, the system is ready to do its level best. **ST**

Chris Harrison is a veteran free lance turf writer.



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STM uses one machine at UMBC

BY TARA DEERING

With more than 15 acres of athletic fields to maintain, you'd think Eric Plitt, sports turf manager for the University of Maryland, Baltimore County (UMBC), would have a fleet of equipment to perform his score of daily tasks. But believe it or not, Plitt has turned his operation into a one-machine show.

Plitt and his staff of three are responsible for all of the athletic grounds maintenance throughout the year. When Plitt first arrived at the university, the only equipment his department had was a few mowers and a utility vehicle. He says whenever they needed a loader to unload sports materials or perform other grounds maintenance tasks, he would have to borrow equipment from the campus grounds department.

Then about a year ago, Plitt was allocated money to purchase new equipment. At first, he says he considered purchasing several different pieces of equipment to dedicate to specific tasks as diverse as spraying and snowplowing. "We were also looking at some type of angle broom, which came as one unit, and that would have been another piece of equipment. It was adding up to be a lot of stuff," he says.

Then Plitt read about the Toolcat 5600 utility work machine, which has the features of a utility loader, pickup truck, and attachment carrier. "After looking at this, it knocked off like five pieces of equipment, and it actually was going to cost less to get it," he says.

But the athletic director had to see for himself that the utility work machine could do the work of several pieces of equipment before signing off on the purchase. "I talked it up because he was a little leery at first. Then I had the dealer bring one down, and I just drove around doing odd things that we could have never done before," Plitt says. "He was sold."

Plitt says that recently the machine helped clear overgrowth on a large hill at the university's soccer stadium. He attached the mower to the 46-hp 5600 and drove it straight up the hill. He says he was impressed by how the turf tires on the machine provided added traction while exerting low ground pressure, enabling him to easily climb the hill while causing minimal ground disturbance. "It would have taken three guys probably six hours to cut weeds on that hill, and we knocked that whole thing out in about an hour and a half," he says.

Like many universities with sports facilities, the UMBC athletic grounds department often receives deliveries of palletized lawn materials. This is where the pallet forks come in handy, Plitt says. With the pallet forks and the machine's 1,500-pound rated operating capacity, he says he can easily unload and haul topsoil and other materials where they need to go.

"That definitely saves us a lot of time," Plitt says. "Before we would have loaded the pickup truck by hand from our warehouse, and then drove it all the way back down to where it had to go and unloaded it by hand."

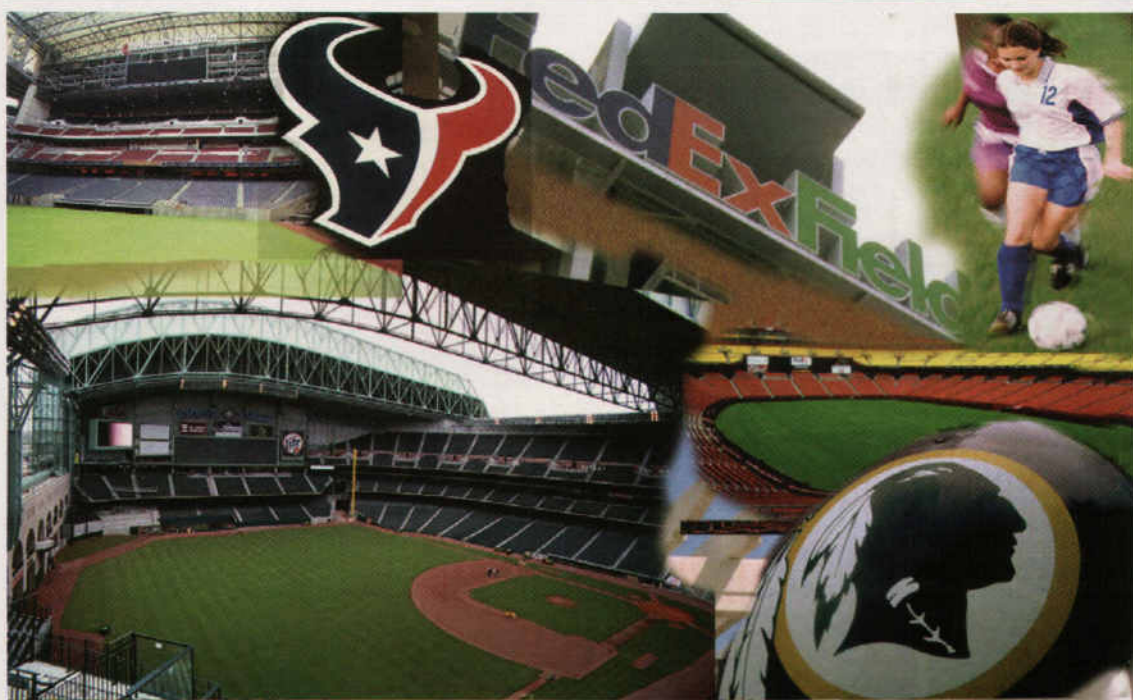
Using the pickup truck to unload and haul materials also didn't allow them access to confined areas in and around the athletic facilities. Plitt says the 60.5-inch wide machine fits through the softball and baseball fields' fence gates.

Plitt also uses the machine to remove snow, with both the angle broom attachment and the blade.

Plitt doesn't view the enclosed cab as a luxury but rather a necessity for staying efficient year-round. For example, he says, the heat not only helps keep the windows defrosted in the winter, but it also enables operators to work longer by keeping them warm.

"I would say we're at least 40 percent more efficient than we were before," he says. **ST**

Tara Deering is a technical writer for Two Rivers Marketing, Des Moines, IA.



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The attachment requires no hard wiring for use with a laser guidance system. In this application, the laser system controls all blade movement for very precise grading.

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Francis Scott Key STADIUM	2.41	2.04 miles	64	E 3mph
Morrell Park School	2.38	2.76 miles	65	ENE 3mph
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Time Lapse: 14 Hr, 30 Day, 365 Day

LOCAL FORECAST

HQA: Baltimore, MD

Today

Increasing clouds. Highs in the lower 80s. Light winds.

Tonight

Occasional showers. Not as cold with lows in the lower 50s. Southeast winds 10 to 15 mph. Chance of rain 60 percent.

Friday

Cloudy with showers likely. Highs in the upper 50s. Southeast winds around 10 mph. Chance of rain 70 percent.

Friday Night

Cloudy. Showers likely in the evening. High chance of showers after midnight. Lows in the mid 50s. East winds around 10 mph. Chance of rain 60 percent.

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