

# Laser technology makes tee grading job easier

## Computer model man Ed Connor does it again

By Mark Leslie

The man who brought you the computer terrain model to preserve historic golf courses has introduced another technology to the world of golf course construction. Move over, stakes and grade lines. Come on down, laser emitters, gyroscopes and radio-controlled drag scrapers.

"Golf course managers are coming out of the woodwork to look at it," said Edward Connor of the laser equipment he has now used to grade tee areas at Pebble Beach Golf Links in California and Seminole Golf Club in Florida.

Speaking of his current work at two Nashville, Tenn., municipal courses, Connor said: "We've got 120,000 square feet of tee space here. We lasered it and laid a two-inch layer of sand over the top and lasered it again in three days.

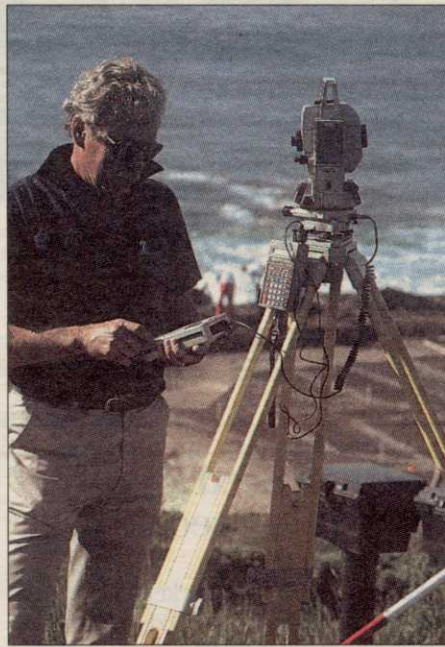
"It used to take me at least a month for that kind of work."

Connor predicted the industry would see the laser gear used as a standard of construction in the future. "It's just too good for one guy to have as a secret for very long... It's one of the best tools I've ever seen for new construction or renovation," he said.

As important as speed is to the equation of rebuilding tees, precision is even more crucial, according to Connor.

"The big advantage is that it allows you to do what the agricultural people have been doing for years when they flood-irrigate large fields. It allows you to put a very flat grade with uniformity on a surface like a tee," he said. "Once you get over a three-percent slope the people standing on the tee can feel it... But to grade less than three percent has always been a problem. You run into the danger of pockets. And when you get down to one to two percent, the threat of pockets becomes significant. Naturally, you don't want anything that holds water or presents an uneven surface."

For years architects have often opted to build a crown onto the tee and "live with some unevenness rather than risk getting a pocket



Ed Connor, above, sets readings to guide his box blade, right.

or an uneven settlement spot," Connor said. "We've now gone a long way in eliminating that problem. We can grade tees very confidently at one percent or even half a percent. And it's so fast that one man can do what used to take a crew of five people..."

"If you don't have a laser you have to have a gun and a rod. That takes two people and it's tedious. It's moving a little bit of dirt and shooting with a gun and moving some dirt and shooting it again. With the laser you do everything from the seat of the tractor — from adjusting the height of your target to adjusting the slope if you find out you entered in the wrong degree of slope into the laser."

Connor added: "All of my construction career I've been taught to avoid straight lines and formal features on a golf course to simulate nature's random look. Tees, however, demand precise construction methods."

### HOW IT WORKS

Connor's equipment includes a tractor, scraper blade and laser apparatus. A laser



*'It used to take me at least a month for that kind of work (that took three days with laser technology).'*

— Ed Connor

emitter — with a gyroscope to automatically level it — is mounted on a tripod and set up on a neighboring hillside or even on the tee. The laser receiver is mounted on a "mast" built onto the blade apparatus.

Connor sets perpendicular and parallel axis grades on the emitter's digital readout. He then sets the speed of his laser emitter at around 20 revolutions per second, "which gives me the quick enough response that my blade won't float out of position."

The emitter rotates on the plane he established to within one-thousandth of a percent, and sends a signal to the receiver, which is attached to the scraper on the tractor. The scraper blade is hooked into a six-way hydraulic valve that is attached to the receiver.

"Its most frequent and common use is in agriculture where they have to pull a grade over a field for a couple of miles. It's no big deal for old farmhands, but we sophisticated golf course builders just caught onto it this year," he joked.

"We try to grade tees in conformance with surrounding terrain so the tee doesn't look like it's artificially constructed. If the ground slopes toward the green that's the way you want your tee to slope, but not severely... because everything over three percent is noticeable," Connor said.

"I try to get a zero grade from side to side so right- and left-handers will have an equal footing on the tee. I'll try to go one to two percent from back to front or front to back, depending on the natural grade."

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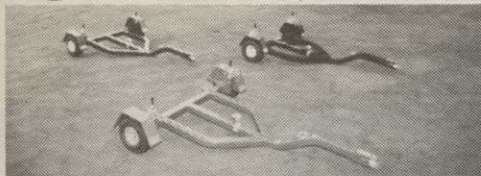
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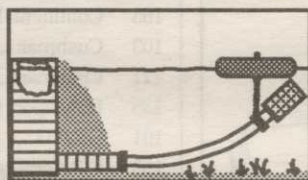
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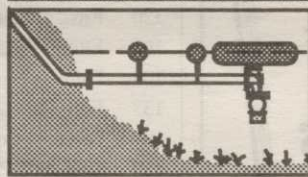
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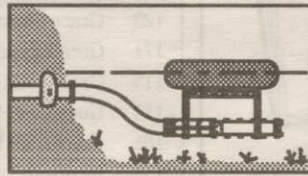
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"I'm no longer crowning tees because every time I crown a tee, from year to year I see half of it being used and half of it not being used. The part that would put the ball below the player's feet is not being used."

Connor said the laser is also effective because "I don't have to jockey dirt back and forth."

"In the old days, when a tee area was short of dirt, I'd have to shut the tractor down and bring in dirt if I wanted to hold the grade. What I do now is just hit a button, raise the mast another one-tenth of a foot and it drops the grade. So I can use what dirt I've got to achieve the perfect surface. And if the hole tee ends up being a couple tenths lower or higher, it is of little consequence."

### DRAMATIC EFFECTS

Connor fondly recalls the day a year ago that he happened upon the laser device, which he said he "plagiarized" for use on golf courses.

He was renovating Palma Ceia golf course in Tampa, and was driving onto the site one day when he went by the 17th tee, which was at eye height.

"I did a double-take of this tee. It was the most beautiful thing I'd ever seen. I could look at it at eye height and it looked like it was sliced with a diamond cutter. It was perfect. I said, 'Wow! What did that?' I had been around golf course construction all my life and never seen a tee look that good."

He checked with the course builder, Sunbelt Services of South Florida, "found out where that machine was and a week later I owned one."

Connor said one reason the city of Nashville was persuaded to re-do the tees was "This was where they were going to spend only 20 percent of their money but they'd get 80 percent of the praise."

He told officials: "People see a tremendous improvement in the look of the course and that's what's going to make it politically palatable for you to spend the money and take the courses out of play for a season. When golfers come back they will dramatically see a difference, whereas if you are just doing greens, the greens only looked stressed here a couple of months a year and the improvement in turf environment is not obvious until several seasons have elapsed."

He said: "The greens have always been the artist's tapestry. It's hard to look at a green and say there's a mistake unless it's really blatant. But you could always look at a tee and notice a flaw immediately."

Connor looks to a future of designing and renovating golf courses using the computer models, laser equipment, and whatever other marvels modern high-technology brings.

"The thing I've had going for me and the reason I've managed to get jobs is that by combining these technologies, we have made significant inroads in preserving famous old golf courses like Pebble Beach and Seminole. The combination is hard to beat," he said.

"It took me about six months to put the lasers and computer together. I thought it would be a lot more popular than it is, but maybe it's more difficult than I gave myself credit for. It's expensive and time-consuming. But in the long run I think it's really going to be a boon."

He said that until 1987 when he renovated Pinehurst No. 2 in North Carolina, a preservation-oriented philosophy was impractical. The technology was too expensive and too slow.

"That is no longer the case. Computer models of course features become more valuable with each passing year, as subtle changes occur in greens and bunkering due to topdressing, wind, rain and settlement," he said.

"The great success of the computer modeling concept is due to recognition by astute management of golf facilities like Pinehurst, Seminole and Pebble Beach as to the long-term benefits of accurate records and importance of preserving old golf courses' features."