

Pinpoint Accuracy

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By Larry Stalcup

Strip-tilling with sub-inch accuracy? That's a pretty tall order no matter how skilled the tractor driver.

Not for David Batson — a new auto-guidance system is enabling the northern Missouri grower to perform precision strip-till operations even when planting lines are completely covered with residue.

Batson farms about 5,800 acres of corn, soybeans and wheat near Trenton, MO. With that many acres, strip-till farming was the best way they knew to reduce inputs without suffering yield losses.

“We plant corn in 30-in. rows and soybeans in 15-in. rows,” says Batson. “Our goal is to plant both crops into the exact slots in the vertical-tilled strips. The most efficient way we found to do that was with the AutoSteer system that provides sub-inch accuracy.”

AutoSteer, part of the AutoFarm network of auto-guidance systems, operates via global positioning system (GPS) technology. AutoFarm is a branch of IntegriNautics, www.integrinautics.com/agriculture.htm. Signals from any of some 30 satellites orbiting the Earth beam data to an AutoSteer portable base station on the Batson farm. That information is then transmitted to tractor-mounted antennas that lead to an in-cab touchscreen window that operates as easily as an ATM machine.

The system is an RTK system, or real time kinematic system, that has sub-inch accuracy, the type of auto-control being sought and used by more and more growers with access to space-age farming techniques. RTK systems cost \$40,000-plus. Auto-guidance systems with 4-in. accuracy are also growing in popularity. They cost \$10,000 or more.

James Lowenberg-DeBoer, director of Purdue University's Site-Specific Management Center, says auto-guidance is the next step beyond lightbars that have become common among farmers and custom operators in the Midwest.

“The technology takes over steering of farm equipment,” he says. “The driver still has to turn the tractor at the end of each row, but during the pass in the field the driver can take his hands off the steering wheel, talk on his cell phone or do other things.”

For Batson, being hands-off means he can turn around and keep a close eye on his 35-ft. John Deere 1690 air seed planter or his Case IH 1200 16-row, 40-ft. “Pivot IVOT Transport” planter. At the same time, his Case IH MX 270 tractor follows to the sub-inch line for precise planting.

“I (or whomever is driving) can keep an eye out for any clogs or other problems during planting,” says Batson, whose son Mike often takes his turn in the tractor at night planting or during other field operations. “And without having to constantly keep your hands on the wheel and your eyes straight ahead, there's less fatigue.”

Batson's reason for switching to strip-tillage was to increase yields. "We had reached a plateau on our corn and soybean yields," he says. In the strip-till plan, vertical strips are cut into the soil along with banded fertilizer in the fall. Seed is planted into the strips in the spring. "We look for a 15-20% increase in yields with the strip-till program," says Batson.

The AutoSteer system improved the strip-till accuracy. Without the system, keeping planters in exact rows would be difficult even with row marker arms. "We were going to have to spend about \$7,000 and still wouldn't have the type of accuracy we wanted," says Batson.

The initial planting was an exact science after Batson and his AutoFarm rep, Brent Kuehnast of Des Moines, entered row coordinates into the auto-guidance computer. Batson had originally wanted the company's 4-in. accurate system, Step One. "But he was intrigued by the new 'curves' module for the RTK system," says Kuehnast, "which can actually shape a curve to contour perfectly throughout a field."

He wanted the repeatability of the RTK system so it could be used in spraying for weeds or applying fertilizer. "Since we had to replant some soybeans after heavy rains in the late spring, we were able to plant back into the vertical strips," Batson says.

"For 2005, we'll use the system to split our middles to go 15-in. over from where we planted corn this year. With AutoSteer, we'll be within 1 in. of where we want to be," he says. "We can also plant at night or in fog or dust and remain in a perfect line in every pass through the field."

That exactness is a not luxury in strip-till operations, says Purdue's Lowenberg-DeBoer. In his research, with associate Matt Watson, the scientist examined the value of both the 4-in. accuracy and RTK systems to a typical 50/50 corn and soybean grower in Indiana.

"In situations where accuracy was an issue, the grower was better off with the RTK system," says Lowenberg-DeBoer. "An example is controlled traffic. If you want to use only certain tracks through the field and repeat those operation after operation and year after year, then the RTK allows you to stay on those same tracks and limit wheel traffic on that field. Another example is strip tillage.

"If you want to make those strips in the fall and then come back in the spring and plant on those same strips, then the RTK — with that 1-in. accuracy — is what you need."

He says the 4-in. accuracy auto-guidance system may be best for a typical 1,800-acre grower who wants to expand up to 2,400 acres. "That system makes a lot of sense," he says. "The reason is that it allows farm equipment to be used for more hours and there's less fatigue on operators, so they can work longer hours. Also, farmers have greater flexibility in choosing employees, because it requires less skill on the part of the employee since the computer is doing a lot of the steering and other detailed work."

The study also found that benefits from auto-guidance equipment were realized only when machinery was driven more accurately, more consistently and/or for longer periods each day.

Estimated field time for the 1,800-acre model, not counting harvest, was 496 hours if no GPS guidance system was used. A farmer using lightbar technology could cut that time 11%, to 439 hours. Replacing the lightbar with either the 4-in. or RTK auto-guidance system trimmed another 6%, to 411 hours.

The 4-in. auto-guidance system afforded the largest increase in returns for expanding farms, at \$7.36/acre, based on an anticipated expansion from 1,800 to 3,100 acres with the same set of equipment.

A farmer using RTK guidance with other equipment the same increased returns \$3.41/acre on 3,100 acres. But those numbers would increase when farm operations required spatial accuracy for strip-till operations, controlled traffic, etc. The auto-guidance study is available online at www.agecon.purdue.edu/extension/pubs/paer/gps.asp.

Guidance Systems

Along with AutoFarm, there is a growing list of ag GPS auto guidance systems. They include: AgLeader, www.agleader.com; Beeline, www.beeline.ag; Case IH, www.caseih.com; Cultiva, www.cultiva.com; John Deere, www.deere.com; Outback, www.outbackguidance.com; Raven, www.accuspray.com; Satloc, www.satloc.com; Terradox, www.terradox.com; and Trimble, www.trimble.com/gps/.

Strip-Till Advantages

When and where could it help?

Mahdi Al-Kaisi, Iowa State University assistant professor of agronomy, says strip-till operations can improve production in areas in which soil is cold and damp and has poor drainage.

“In fall strip-tillage systems, producers open a zone of soil within the crop residue with a minimal-impact tillage operation where next year's crop row will be planted,” he says. “The distinction is that the strip is tilled in the fall instead of in the spring in front of the planter.”

He says fall strip-tillage requires tilling of only one-third of the soil in strips 6-8 in. wide by using one of the following: modified anhydrous ammonia applicator knives, a rototiller, in-row chisel, row cleaners, double-discs or other implements.

“With anhydrous ammonia applicator knives, consider moving the knife positions out of the wheel track area, so planting does not occur in a wheel track,” he says. “More fall strip-tillage tools include cultivator sweeps and other angled blades that lift soil. The tillage zone provides relative positions for seeds, fertilizers or anhydrous ammonia.”

Al-Kaisi says an auto-guidance system should benefit growers using strip-till production.

“With strip-till, you need to fit the planter to fit the tillage system,” he says. “You need to be as close as possible to the till zone in terms of nutrients and warming up the soil to create a more suitable seedbed, especially in cold wet soils. If a grower can use the auto-guidance technology to utilize the till zone more effectively, that's the correct use of strip tillage.”