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## AgRobotics: A Revolution in Soil Testing

By Nate Hinkel - 10/29/2007

Without hesitation, Jim Burton of Newport declares the process of soil testing as the single most mundane and backbreaking chore he had to endure in his 35 years of farming.

Now Burton has designed a soil-testing product that has the agricultural industry buzzing. Burton's company, AgRobotics Inc. of Little Rock, is nearing the end of research and development on the AutoProbe, an all-in-one, self-guided roving machine that promises to automate soil testing using Global Positioning Satellite technology.

"If the product turns out like it's expected, there's no question it has the capability to be a major contributor to furthering the modernization of agricultural practices," said Terry Brasse, associate professor of agricultural geospatial technology at Kirkwood Community College in Cedar Rapids, Iowa. "Soil testing has long been a dreaded process, and anything that makes that process faster, cheaper and more efficient, I think will be embraced."

The AutoProbe, in its final stage of development before the first batch rolls off an assembly line at the start of 2008, is billed to accomplish all three.

Though there are some partially automated soil testing devices already on the market that make the process easier, none are self-propelled or auto-steered. Farmers traditionally roved their property either by foot or four-wheeler, stopping and going as they dug up samples, packaging and labeling them as they went.

The AutoProbe's inventor says that even though soil testing is critical to crop yield, the average farmer might only sample his soil once every three years, and only about 10-to-15 percent of farmland in the world is sampled at all.

"It's because it's just no fun," said Burton. "It's backbreaking, tedious, hot ... but no doubt farmers are more successful when they have their nutrients right and they know the lay of their land. If there was an easier way, I don't think there'd be any excuse for a farmer not to test his land."

The AutoProbe received a huge vote of confidence earlier this month when the world's largest agricultural trade show - the World Ag Expo held every February in the agriculturally rich San Joaquin Valley in Tulare, Calif. - featured the product as one of 10 up-and-coming agricultural developments to watch.

With that announcement, AgRobotics' timeline was set: Roll an initial production of 30 to 50 AutoProbes off the line in 2008, beginning with the unveiling of the finished machine at the World Ag Expo in February.

"The timing is right on," said Jeff Burton, inventor Jim's son, who is handling the marketing and business development of the AutoProbe.

### Farm Dreams

Jim Burton has always felt like an engineer and inventor disguised as a farmer. After earning an agricultural engineering degree from the University of Arkansas in 1965, he began his farming career in tiny Tupelo about 15 miles south of his home in Newport.

When GPS technology took off commercially in the early 1990s, Burton says he envisioned great things for the agriculture industry, and most have come to pass.

He applied that kind of vision to his longtime desire to simplify soil testing, and that was the start of AutoProbe.

After finishing a prototype in 2002, running out of money and subsequently parking the project, he learned of the Donald W. Reynolds Governor's Cup business plan competition held annually by the UA's Sam M. Walton College of Business.

The competition taps business students to draft business plans for Arkansas products at no cost to inventors or companies, and AgRobotics won it in 2006. The company won a similar competition in Nebraska later that year, but the award was later taken back due to a technicality. That exposure and outside critique, along with another impressive showing at a competition in Portland, Ore., yielded some valuable feedback that gave the AutoProbe new

life - and nearly \$1.2 million in seed capital from about 16 initial investors.

"We got some feedback that we took to heart and kind of changed directions," said Jeff Burton.

One of the biggest changes was reorganizing how the product will hit the market. The Burtons originally planned to sell each AutoProbe for around \$25,000, but one of the judges in Nebraska recommended leasing the machine to dealers and chemical companies at a per-acre price that would bring in more than \$100,000 per year.

### **What It Does**

There's currently nothing like the AutoProbe on the market, according to Jim Burton. There are devices that do similar things, but most have to be pulled behind an all-terrain vehicle or pick-up truck that has to stop and start constantly.

"In development, I knew if we could come up with a way to keep a soil tester moving, utilize GPS and GPS-related software, and find a way to make it easy for a farmer and cut back on time, then we'd have a winner," said Jim Burton.

The AutoProbe is a GPS-equipped and auto-steered vehicle that pulls a track system in its wake that plugs a soil collection device into the ground every 15 linear feet. The soil is spit out into an air system that blows the sample back to the vehicle and packages it neatly into an individual sample. An on-board labeler automatically spits out a tag with coordinates and other pertinent testing info. The operator, who is hands free because of the GPS auto steering, can pull the label and attach it to the sample box. All of the samples are then sent off to a lab for testing, and ultimately that data is fed into specially designed on-board software that lets farmers know exactly which nutrients to apply exactly where, among a slate of other relevant data.

"All of that is mapped out by the individual farm, and more accurate historical records are kept almost down to the exact centimeter of farmland," said Jeff Burton. "That ends up saving on chemical and treatment costs and on down the line."

Jim Burton added that cost saving on chemicals and fertilizers is extremely pertinent since the cost of fertilizer has nearly quadrupled in the past five or six years.

### **What Now?**

Nearly 14 months ago, Jim Burton had gone about as far as he could go with his prototype when Jeff hesitantly offered to find an engineering firm to help get the product market-ready.

"He was reluctant, of course, at first, but we both agree that it's been a beneficial decision," said Jeff Burton. "The first time I brought it up, he wasn't going to have it. One of the things that kept coming up is how we were going to get it from here to there. He finally caved in."

AgRobotics hired Diedrichs & Associates Inc. of Cedar Falls, Iowa, and Jim Burton has been living there and heading a team of engineers that is working out the final kinks. The firm is noted for the copious amount of work it does for nearby John Deere & Co.

Some of the roadblocks the team has overcome include finding an efficient way to get the soil out of the collector, breaking it up, and getting it to the operator for packaging.

"There was a lot of hit and miss, but we got it," said Jim Burton.

Currently, AgRobotics is working towards a 100-hour endurance test to see if it'll run without any problems. The company will then finalize the drawings, get another machine manufactured with all the changes, including the addition of a shell to cover the inner workings for safety and aesthetic purposes.

At the same time, Jeff Burton says he is lining up a few initial "strategic partners" so 20 to 30 AutoProbes can be assembled and distributed for a soft launch and to get some revenue flowing.

"We'll then look at moving the assembly from the Midwest to central Arkansas somewhere," said Jeff Burton. "We want to keep this product as close to Arkansas as possible - an Arkansas product conceptualized and marketed by Arkansans."

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