



Driving Precision Progress with Affordable, Accessible Solutions

Streamlined systems are connecting a new segment of farmers with foundational ag technology to improve production and profit



Access and Cost

These are prominent barriers to precision ag adoption for a segment of farmers in North America, and even more so for developing operations around the world. But industry stakeholders see opportunities to overcome adoption obstacles — especially on small and mid-sized farms — with simplified, scalable solutions.



Guidance

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"Early adopters tended to be larger farms or those in a position to purchase new equipment because that was their entry point," said Curt Blades, senior vice president of the Association of Equipment Manufacturers (AEM). "What we are quickly finding is a democratization of technology. What started out as a luxury for those early adopters, is now a necessity for everyone."

Autosteer is a prime example. One of the most proven and practical precision ag tools, the decade's old technology is a foundational building block for machine learning and advanced autonomy. A recent AEM report

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estimates autosteer adoption at near 80% in parts of North America. However, cost and availability continue to limit autosteer adoption among small to medium-acreage farmers running mid-sized tractors.

To help bridge the precision gap, Topcon Agriculture launched its new Value Line Steering solution in October 2024. The system offers a streamlined, reliable entry point for automated steering.

"Autosteer is a competitive market," says Antonio Marzia, executive vice president and general manager of Topcon Agriculture. "To think more democratic and value-driven, requires a change in design. Scaling down doesn't meet demand. We need to consider the needs of the farmer — and be simpler."

Competitive Balance

The pathway to improving food sustainability, minimizing environmental footprints and maximizing labor efficiency is being paved by precision ag with one caveat. "The number one consideration is that it has to solve a farmer's problem," notes Doug Schmuland, senior director, Global OEM Coordinator, for Topcon Agriculture. Large farms understand the economics of investing in sophisticated ag technology to maximize the performance of six-figure equipment.

But for operations with a mixed fleet and range of tractor horsepower, finding proportionately priced precision ag systems can be cost prohibitive.

"A farmer who spends \$40,000 or \$80,000 on a tractor can't afford to spend the same on technology for it. It doesn't pencil out," Schmuland said. "They need to be able to scale technology to the machinery investment."

At the same time, farmers with high- and low-horsepower tractors want to utilize the same precision technology in both machines. The ability to integrate a universally compatible steering system that balances cost, accuracy and ease of use gives small and mid-size farms more financial flexibility.

Early autosteering systems were costly and often complicated, especially when it came to calibrations. As Marzia notes, every tractor — large or small — steers differently.

"With the processing power and auto-tuning capabilities of our system, operators can drive straight for 10 seconds, go left or right, and the system will auto-calibrate," he says. "This makes the technology more democratic and adoption easier across machines."

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As a result, small and mid-size farmers can increase machine performance and productivity which are critical to turning a profit.

"My aha moment with precision was the first time I sat in a tractor with autosteer," said Hawkinsville, Ga., farmer Brian Dunaway, who added the Value Line system to accurately mow 500 acres of turf grass. Trying to manually mow in a straight line was a stressful task for Dunaway and his operators, which often led to too much or not enough overlap with each pass. "We're a lot more confident and accurate now," he said. "Adding autosteer made us at least 20% more efficient, and we're using 20% less fuel and spending 20% fewer hours in the mower tractor."

Generational Appeal

Driving straight with each field pass is proven to increase efficiency in fuel, fertilizer and time. But now, entry level farmers covering small plots of land can also automatically record and review pass-to-pass information.

How farmers apply mapped field data varies by region, but simply having the ability to record it creates precision ag possibilities that never existed. Prescriptive seeding and fertilizer application with sub-inch accuracy become attainable goals rather than unknowns.



"These factors are pushing technology to the extreme," Marzia said. "All this technology produces immense amounts of data, which is essential to machine control and operational improvement, year after year. But it's also essential to build the farm ecosystem."

Input suppliers, agronomists, food chain companies are participating in developing sustainable ecosystems. Access to baseline technology that captures decision-making data is allowing a new segment of farmers to contribute to sustainability. This is significant as generational transition is occurring on many farms and renewing a sense of environmental responsibility. The control of inputs, fuel consumption and smart crop management with precision ag are all fundamental to building a modern sustainable farm.

"There's a new generation coming into the businesses and technology is more integrated into their daily lives, which makes it easier to adopt into the farm," Schmuland said. "A young farmer in a developing market has just as much worth as a corporate farm in North America or a medium-sized farm in Europe or an entry level subsistence farmer in India."

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Scaling Interoperability



As the industry continues to break down barriers to ag tech adoption, farmers new to precision will be able to match ambition with achievement.

Interoperability of precision ag is key and clearer communication between technology and machinery brands allows any farmer to be more productive. It's also a building block to AI and autonomy.

Autosteer acts as a bridge to AI-driven farm automation. Once farmers adopt it, they are more likely to explore AI-powered tools like autonomous tractors, drones, and precision analytics, leading to a smarter, more efficient agricultural future.

But for a long time, smaller equipment was overlooked in terms of precision functionality, said Dunaway. Compatible solutions that work across multiple sizes and brands of equipment can rapidly minimize the learning curve for operators — a benefit Dunaway realized on his farm.

"In a situation where we need another employee and another mower and another tractor because we can't quite get around, the Value Line system paid for itself, right then," he said. "Anything we can do to maximize our equipment is going to pay for itself."

The rapid evolution of ag technology is pushing production limits faster and further than ever before. And it's safe to say, change will never be this slow again. "We're on the front of a big acceleration in tech adoption," Marzia notes. "Ag is virtually autonomous now in its functionality. In the last 5-6 years, we've ramped up production due to the evolution of machinery being more electronic to the point of being a computer on wheels."

"We've seen the cost of new sprayers increase more dramatically than other equipment during the last 10 years. A new \$300,000 sprayer in 2013 costs almost twice as much today," Wolf says. "Farmers are more reluctant to spend on a new machine, so the retrofit market is alive and well in spray technology."

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5 Ways Entry Level Auto Steering can Lead Farmers into AI and Advanced Autonomy

Auto steering is a foundational step toward full AI-driven autonomy in agriculture. Entry-level systems introduce farmers to precision technology and automated systems, making it easier to transition to more advanced AI-driven solutions.

Here's 5 ways autosteer can help small and mid-size farmers progress toward AI and advanced autonomy.

- 1. Familiarization with Automation.** Autosteer gets farmers accustomed to machine-assisted operation, easing the transition to fully autonomous machinery. It also builds confidence in the reliability and performance of precision ag, making farmers more open to adopting AI-driven tools.
- 2. Data Collection and AI Integration.** Autosteer systems often include GPS tracking and field-mapping capabilities. Collected data can be fed into AI-driven farm management platforms for real-time decision-making. AI can also analyze field maps, soil conditions and yield data to optimize future planting and harvesting strategies.
- 3. Enabling Full Autonomy.** Autosteer is a steppingstone to autonomous tractors and robotic farm equipment. As AI and sensors improve, autosteer systems can evolve into full self-driving technology, and autonomous implements that can integrate with autosteer-equipped tractors.
- 4. Maximizing Labor.** Farmers using autosteer experience reduced fatigue, allowing them to multitask or focus on other aspects of farm management. As AI advances, full autonomy could enable farmers to monitor multiple machines remotely instead of manually operating them.
- 5. Economic and Environmental Benefits.** AI combined with autosteer can reduce seed, fertilizer and chemical waste, allowing farmers to accomplish more, while using less. Smarter farming also improves sustainability and reduces environmental impact.



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