



Precision Farming Event 2007:

Science fiction becomes farming fact

It has taken less than five years for precision farming to move from the margins into the mainstream. After gaining genuine and tangible benefits from parallel guidance and auto-steering, visitors to the recent Precision Farming Event were now looking to extend the use of their GPS systems. Mick Roberts reports

Automatic steering of tractors in dead straight lines and with absolute pin-point accuracy is now almost commonplace on UK farms. But soon it will be possible to negotiate the headland turn, without any driver input, as well.

While not out on display at the Precision Farming Event, John Deere has announced its iTEC Pro (intelligent Total Equipment Control) will be available on the firm's high-hp 8030 tractor models in Nov '07.

This represents an enormous leap forward in automation by combining the functions of the tractor's

Implement Management System (IMS) with the AutoTrac integral auto-steer. All of this assembled new technology is controlled via the GreenStar II terminal in the tractor cabin. Essentially the system delivers complete hands-free control for fieldwork.

"The seamless integration of the tractor and the automatic guidance system cuts the time it takes to turn on the headland by about a third," explains Mark James, John Deere's AMS manager. "Reducing the overlap on the headland also results in about a 2% input saving," he adds. First task is to map the field boundaries,

John Deere's Total Equipment Control (iTEC) Pro combines the functions of the tractor's Implement Management System (IMS) with AutoTrac auto-steer to automatically steer the tractor around the headland while operating all the implement functions. There's no operator input required.





while AutoTrac steers the tractor on to the next row. Operators literally sit back and watch it all happen," adds Mr James.

JD iTEC Pro may currently represent the pinnacle of tractor/implement control and auto-steer technology, but it's also just one area of precision farming. There are, after all, many others. Neil Cameron, an associate

The Agrocom Eye-Drive optical sensor provides high precision auto-steering at a cost of £8,400. It relies on a front-mounted camera to scan a 45° angle in front of the tractor, following plant rows, a marker line, ridges or tramlines. Claimed accuracy is +/- 3-5cm.

log any obstacles and inform the system of areas that are 'passable' (where the subject tractor is allowed to drive) and 'impassable' (hedgcs and ditches etc). Programming the tractor steering means setting up for a linkage-mounted, trailed or semi-mounted implement and the min turning radius. The working width is also required as part of the process.



Next job is to program in the implement turning sequence.

This can now be done without having to drive in the field or operate the functions. Instead, operators use the GreenStar II terminal to select the action to be carried out – such as cut travel speed, disengage 4WD/pto/differential locks, raise the implement and so on, and also where in the sequence this action is to happen using a distance setting.

There is also the system facility to save the sequences for a number of different implements, while a 'virtual' headland mark sets where the automatic sequence should start – for example, slowing the tractor and reducing engine revs from, say, 10m ahead of the actual headland mark at the end of a bout.

"Then it's just a case of hitting 'resume' and off you go. The virtual headland mark triggers the IMS sequence, which then carries out all the implement functions,



Required for legal high speed road use, the JCB Fastrac's positive steering makes it more difficult to equip the tractor with integral auto-steer. New entrant Beeline Technologies has developed a retrofit kit to become one of the first to offer auto-steer for these models.



agribusiness consultant for Bidwells, who was speaking at the Event's seminars, notes more farms now need to look carefully at employing technology to improve productivity and boost profits.

"Precision farming is not solely about electronic gadgets. It is a wide ranging management tool that uses technology to improve job accuracy and enhance the overall efficiency/quality of operations," he says. "If, however, you start to invest in the systems too early, there is a chance they may end up being nothing more than an expensive toy. Then again, if you're too late into the technology, you risk falling behind the competition."

GPS receiver units, on which much of the new equipment is based, are not only far more accurate today, but they are also considerably cheaper than in the past. In addition, a wide range of correction signals can be accessed to achieve the level of precision to match the task.

At the same time, Mr Cameron says, there is now a broad selection of sensors and techniques that can be utilised for yield monitoring, soil nutrient analysis, crop canopy measurement and determining soil moisture.

"It is vital to analyse the information from these systems to make better informed management decisions. It's also critical to consider the science behind them, as this is the glue that holds it all together," adds Mr Cameron.

"The fundamental reason for investing in any system is to improve profitability. So, before buying it is important to consider: Will the system increase my margins, by increasing yield and quality and reducing input costs, while also improving labour and machinery efficiency?"

In future, precision farming technology may also become a vital way of helping farms to target limited quantities of crop inputs at where they will have the most effect, he believes. At the same time the datalogging functions, plus applications

based on full scientific reasoning, will provide complete justification for all of these various inputs while also meeting crop assurance and legal requirements.

"The level of data that can be gathered in 'real time' when equipment is working in the field will increase operating

efficiency. For example, more farms are now relying on a single combine to cut at least 1,200ha with a potential throughput of 12,000t/season.

“Just a 1% reduction in harvesting losses could lift profits by £12,000. This is now entirely feasible using telemetry, which allows farm managers to assess combine performance via the internet, while the machine is working,” he adds.

Indeed, such a system is now available for Claas combines, costing £4,400 and an annual service fee of £850. Last year 17 of the firm’s combines in the UK were fitted with telemetry. On these models, everything that is monitored by the Cebis on-board computer is noted every 15secs and then sent back in 15min ‘packages’ via GPRS (mobile phone signal) to Claas’ HQ in Germany. Here it is processed and uploaded to a web page, where dealers and owners can view the same info that is available on the machine.

At Precision Farming, Paul Moss, product manager for Claas combines in the UK,

asked his telemetry seminar audience: “How many people see a place for this sort of technology in UK agriculture?” Hardly a hand stayed down!

“We started using the telemetry system for preventative maintenance, like other industries. But after seeing the data we had on performance we realised that it is a powerful tool for boosting operational efficiency,” Mr Moss explains.

Post-harvest analysis showed the most efficient machine fitted with the system in the UK spent 80% of its time combining, 6% on turning at the headland and 13% moving between fields. The least efficient telemetry-equipped machine, however, spent just 54% of its time harvesting, 26% moving between field sites and 18% of its time turning. This harvester also spent 2% of its time unloading while stood still – twice as much time as the most efficient unit analysed.

“We know who these farmers are. The first one has quite a few 80ha fields and is totally committed to block cropping.

“Interestingly, though, the owner of the least efficient combine was certainly not unhappy with his machine and, in fact, was chuffed to bits with the way that his harvest had gone!

“This just illustrates that if you can’t see there’s a problem, how can you solve it? Now we can go back to the owner of the second combine and suggest to him ways

Soil Essentials’ ‘CropCircle’ sensor, which scans and measures the leaf area index of a crop, can vary fertiliser applications in ‘real time’. The sensor and control box adjust the rate, on the move, relative to recommendations in the HGCA wheat growth guide.



Pear Technology is developing a paperless link between its programs and the Patchwork Technology BlackBox unit. The aim is to ensure that information is entered only once, with a data card being used to store and transfer info about a range of different jobs.

of improving efficiency – such as maybe reducing the time spent turning and to block up more cropping to cut travelling time,” explains Mr Moss.

Improving overall logistics – for example, ensuring combine output is not impeded by something as simple as waiting for trailers – also plays an important role. By loading the data into Google Earth, Claas telematics not only monitors combine progress up/down the fields, but it also notes when the combine is unloading.

A green dot on the map, followed by a green trail, shows that the combine was unloading on the move. A red dot means it was stopped with a full tank waiting to unload.

“Looking at our least efficient combine we could see from the trails that, on most occasions,

there were two combines in the field. Basically, while they were working together they were quite often simply getting in each other’s way. Also, there was not enough back-up to handle their output. This meant one was periodically stood waiting to unload,” adds Mr Moss. This least efficient harvester cut 1,070ha in a threshing time of 218hrs, managed a top throughput – spot rate – of 77.13t/hr and an average of 31.03t/hr. This, adds Mr Moss, is well below what should be expected from the machine.

“The top harvesters in this category are achieving 85-105t/hr throughputs and averages of 45-47t/hr. Just by cutting turning time by 5% will mean that each of the poor performing machines spends 11 extra hours harvesting. That is two combining days saved.

“Improving current throughput by 5% will increase the output from 4.9ha/hr to 5.1ha/hr. This could result in the two machines cutting 0.4ha more each hour – that’s an acre more,” explains Mr Moss. During harvest, telemetry users are able to log onto the web to not only see their own combine performance figures, but also compare this with other users (who remain anonymous) in the same area.

“If owners notice their figures are behind others, they can contact us at Claas and we will check the machine settings, look at what the others are doing and suggest changes that will help improve output,” says Mr Moss.



The EZ-Boom unit is the latest device to join the Trimble EZ range of electronic controllers. The system controls up to ten boom sections, automatically switching them on/off to prevent overlapping previously treated areas. It also adjusts application rate in relation to ground speed.