

# Lighting the world up

*"We're innovating to make the technology accessible to everyone."*

CHRIS WILTSHIRE



Precision technology has revolutionised farming during the past few decades – from its origins as simple location guidance to now wirelessly synchronised fleets. *CPM* explores how John Deere's StarFire has allowed one farmer to reach new heights of productivity.

By Melanie Jenkins

**A**rguably one of the most valued, consistently in-demand technological features available for tractors, John Deere's StarFire has, in one iteration or another, been present on Andrew Melton's farm since the turn of the century.

Fourth generation farmer Andrew and his father Clive purchased the tenanted farm in the early 2000s. Alongside his son, Sam, Andrew now owns 650ha at Peartree Farm, Cambridgeshire and contract farms another 650ha across five holdings. Growing largely combinable crops, he also has a small area of sugar beet both on the home farm and across the contracted area.

Andrew farms conventionally but has looked to implement reduced tillage establishment where possible, keeping the plough on hand for where it's best suited. "We're certainly going to continue to reduce tillage where possible, but aim to farm according to conditions."

The farm's relationship with John

Deere dates back to Andrew's father, with StarFire first implemented after its original launch in 2001. "I remember our local dealer coming to show us this new technology in the form of a brown box, saying it'd help with guidance," he explains.

Back then the farm was applying pesticides and undertaking a lot of desiccations without guidance. "We realised almost instantly how useful it could be so started using it for cultivations too. We also had an early yield monitoring system for the combine, which was clunky but innovative at the time."

## USER-FRIENDLY

When the GreenStar 2600 was released, several machines were fitted with them. "These offered a user-friendly interface and moved us away from using a brown box with buttons to a touch screen display. Data had to be manually transferred using a flash card

and uploaded to a PC and then any transfer back to the tractor had to be done physically, which had its limitations.

"Ideally it should have been done daily but when you're busy harvesting that might not happen for the entire harvest, plus, the data could be corrupted or lost. However, it was still a useful tool all the same."

Upgrading to the new StarFire 3000 receiver and adding RTK modems meant Andrew could achieve the best accuracy available at the time. Shortly after, the farm adopted the GreenStar 2630 system following its launch in 2011. ►



## Embracing technology

Sam and Andrew Melton have adopted multiple forms of precision technology to help improve efficiencies on their farm.

## Charting the stars

A 30-year evolution has seen John Deere's StarFire revolutionise farming

Some sources suggest John Deere's StarFire was first dreamed up in an engineering meeting in 1994, and while the dearth of dynamic abilities available at the touch of a screen seems second nature to many now, the past 30 years has seen dramatic evolution.

As for John Deere's precision ag beginnings, the firm's Chris Wiltshire recalls fitting yield monitoring on combines in 1998. "This was very basic and wasn't linked to GPS location at that point."

But it was the following year when the journey into GPS truly began, with the company adding positioning systems to its combines and tractors. Two years later, a significant launch was held in Seville where GreenStar AutoTrac was released alongside the very first StarFire receiver. "At the time this was known as the 'brown box'," notes Chris. "It allowed operators to set an AB line to steer towards and included a form of parallel tracking, but that was all."

Not long after this, AutoTrac was integrated into the firm's largest tractors. "It was hugely expensive and required an activation SD card to make it work – customers couldn't grasp that there was an activation worth several thousand pounds on a tiny little card."

Around 2005/6 when Chris was working as a sales manager



### The future is precision

Precision technology accounts for a significant amount of the money John Deere invests in R&D, says the firm's Chris Wiltshire.

in the North of England, he had a particular customer who couldn't comprehend why he was paying for something that wasn't physical. "We took him on a trip with a group of farmers to see the system in action and six months later he was telling me he wondered why he hadn't adopted the technology sooner."

Touch screens were introduced in 2005 to improve usability for operators whereas a step change in the technology of the RTK system in 2006 provided customers growing vegetable and high value crops with the ability to work to under 2.5cm accuracy. "The technology developed quickly and by 2011 displays were high-tech with processing power significantly above anything experienced before."

But adoption of this technology didn't go without its challenges. Signal reliability was in its early stages of development and customers losing their connection while trying to drill or harvest crops was not uncommon, leaving Chris and John Deere dealers to work with customers to solve the issues.

"As adoption became a lot more widespread, so too did growers relying on the technology, but they saw the added value to their operations because it gave them a greater level of control," says Chris.

### AUTOTRAC CONTROLLER

John Deere began retrofitting StarFire and its other precision equipment as well as working with external brands. "This is where our AutoTrac controller came into play," says Chris. "And up to this point the software had been collecting a lot of data and using systems such as Gatekeeper to manage it, but this was a one-way set up and there wasn't necessarily a way to communicate across machines."

"Data transfer was also clunky because it was reliant on physical memory sticks and so a lot of customers weren't able to make the most of this information."

To overcome this, John Deere's Operations Center was born in 2013. "While it didn't originally jump off the shelf for customers, it's now absolutely key to managing their machines and their fleet," says Chris.



### Connectivity is key

An increase in the satellite constellations available to StarFire receivers has vastly improved accuracy, says John Deere's Dennis Schrijver.

According to the firm's Dennis Schrijver, this all circled back to the StarFire receiver. "Connecting machines with a StarFire receiver through Operations Center meant they all operated from the same lines and boundaries which was a massive step in terms of management capability."

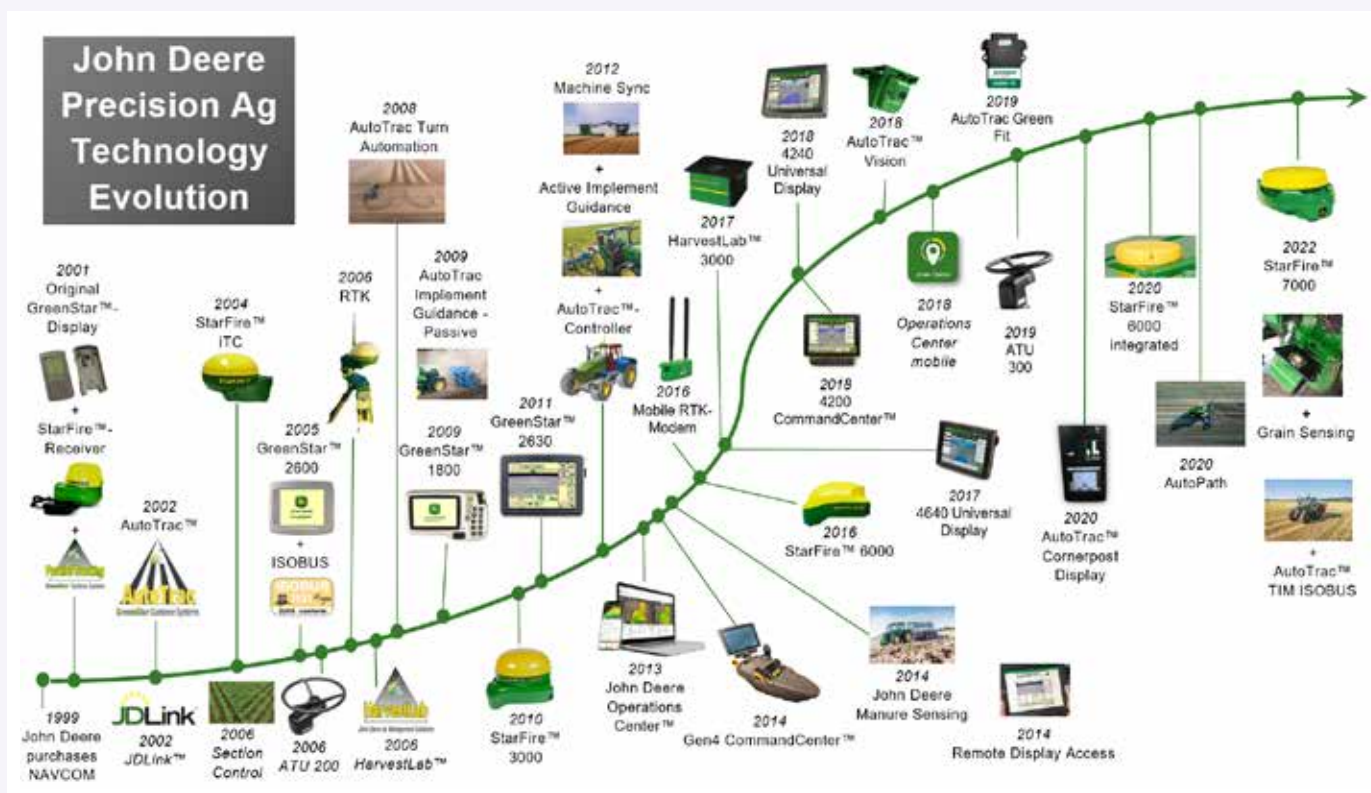
Key to the growing operational capacity of the StarFire receivers is John Deere's satellite network. "The evolution of the technology has been down to the number of satellites it can access which links back to accuracy. The original iteration worked via geostationary satellites but with the StarFire 3000 we began to work with satellite constellations for higher accuracy. We're now at the point where a single StarFire receiver will see 30-40 satellites at one time."

For early adopters, shading was an issue for operators but an increase in satellites, extended RTK and a built-in 14-day buffer – whereby if signal is lost, the system can continue to run off the last known data for 14 days – have helped overcome this.

As of 2018/19, most of John Deere's tractor portfolio above 150hp came AutoTrac ready as standard. "This shows the widespread adoption rate of the guidance system generally," highlights Dennis.

To point out the value prescribed to this software, he says a 14-year-old 2630 display is still worth around £2500 second hand. "The StarFire 3000 has also held its





## Precision ag developments

John Deere has released a raft of new technologies and upgrades with the first StarFire launching in 2001.

value despite known interference from telecoms towers.”

In 2022 the StarFire 7000 was introduced, bringing with it the ability to achieve 2.5cm accuracy through satellite pinpointing alone and without the requirement to use ground-based reference points such as masts, says Dennis. “This SFRTK system does take a little longer than RTK, 3-5 minutes compared with under a minute, but we envisage this altering and reaching a point where it’s the ‘go-to’ instead of RTK.

“We already have autonomous machines operating in the US that only use SFRTK – so we’re ready for autonomous set-ups and see it as the way forward.”

Post Covid-19 and the global supply issues many manufacturers faced while trying to source chips, John Deere took the decision to reduce the two used in the StarFire 7000 to a single one. In 2024 the StarFire 7500 was launched as a result, explains Chris. “It has the same functionality as the 7000 model but runs using one chip to make us less vulnerable to supply issues.”

So what’s next? The firm wants to continue developing technology but Dennis points out that it evolves incredibly fast. “This is one reason we’re starting to think of ourselves

as a software company.”

John Deere’s future commitment is to advancing precision ag technology, adds Chris. “One of our past CEOs said: ‘we’ve bet the farm on precision ag solutions’. It’s such a significant part of the business that we invest \$5m a day in R&D, with precision ag accounting for a large part of that.”

Perhaps one of the most significant challenges has been encouraging adoption, says Dennis. “Around 5-10% of our customers use everything available, but a lot still aren’t using guidance at all, especially livestock farmers.”

## JUSTIFIED SPENDS

Every farm investment has to be justified and the technology fitted to tractors is no different, adds Chris. “We’re innovating to make the technology accessible to everyone with our subscription-based Precision Ag Essentials package – which saves on the up-front costs previously associated with adoption – but ultimately farmers will have to see the benefits for themselves.”

Chris points out that relative to inflation, technology was more expensive to adopt 25 years ago than it is now, but input prices have only become more expensive. “In

the early 2000s, a simple calculation could demonstrate a 10% saving from cutting out overlaps of fertiliser applications, and more complicated calculations would soon produce some very large numbers which would justify guidance – the case would only be stronger now.”

And then there’s the intangible benefits, the ones which farmers and managers might not be able to calculate on paper, he says. “We’re now able to create jobs and send them off to all operators independently and wirelessly, saving time – operators know precisely what they’re doing, essentially eliminating the room for errors. This is all hugely valuable to a business but is difficult to monetise.”

Chris notes when he started with the firm 25 years ago, an autonomous tractor was demo-ed which is now a museum piece. “We’ve been at the coalface of evolving technology but we’ve still had to change our thought process. We may have fully autonomous 8R tractors operating in the US already, but autonomy and guidance looks a lot different on UK farms. Customers on each continent, country and enterprise will view it through their own eyes, but we’re all chasing those cost-savings and efficiency improvements.”

► “If AutoTrac was a revolution when that was first launched in the early 2000s, the 2630 system was the next leap,” says Andrew. “It brought so many benefits to our cultivation and drilling operations. It also allowed us to adopt AutoTrac Turn Automation which we used on our larger tractors such as the 8 series.

“Then when section control was introduced, we used it on our third-party self-propelled sprayer to improve accuracy. Reducing overlaps was incredibly beneficial, reducing chemical use and resulting in less lodging from the overlapping liquid fertiliser and other inputs. This was something we hadn’t been able to control before introducing the technology to our system.”

One of the most significant benefits was the ability to wirelessly transfer data using the cloud, he adds. “I could transfer data easily on a daily basis which improved timeliness, made it more usable and resulted in a far simpler process.”

Overall, this resulted in a step up in accuracy and a boost in reliability for the farm. “Each time a new generation of StarFire is released we notice the increase in signal and performance,” notes Andrew.

These improvements allowed Andrew to look at application data, working off what was actually applied rather than what the planned application had been. “We were applying nitrogen variably using an N-Sensor and this was integrated with our tractors and John Deere system, so the data could be sent to and from the office to create maps and specific plans.”

After its release in 2013, Andrew began using John Deere’s Operations Center (previously MyJohnDeere). “One of the main benefits was that there was no cost to use it and I could collate all of the data from my tractors in one place.”

Data Sync Setup was then introduced to the farm’s self-propelled sprayers to aid with contract work, allowing the machines to work in the same field without overlapping.

The next jump for the farm was moving to mobile RTK. “We used a signal from our local dealer and then moved to base station tripods. It was quite something on our contract farms because we were mobile across the entire area we were farming and could use it further afield than before – it was a significant move for us and is as useful on the StarFire 7000 now as it was on the 3000.”



## Optimising timings

**MachineSync allows the combine operator to take control of the tractor and for automated unloading to improve accuracy.**

Moving to the StarFire 6000, Andrew noticed improvements in reliability, especially when it came to tree shading and the time taken for the receiver to pick up reception. “We then bought newer machines with 4200 CommandCenter terminals which had much improved interfaces, similar to iPads. Everything had become more integrated with the tractors and operator friendly, plus it was seamless to import data to Operations Center.”

By 2018, Andrew could access Operations Center on his mobile, which optimised his use of the system by assessing fuel use and work rates. “I undertook a labour and machinery profile project to chart the productivity per hectare and per hour. This resulted in noticeable benefits to our contracting work because we could determine real time costs and price accordingly, as well as find ways to optimise outputs.”

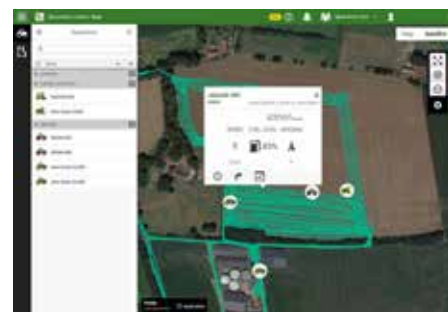
## MODERN APPROACH

Bringing things up to date, Andrew now uses AutoPath, aligning boundary paths for all operators, Data Sync Setup to synchronise data across the fleet, has automated unloading combines into trailers using MachineSync to optimise filling and introduced StarFire 7000 receivers to a number of machines.

“The new receivers run off an increased number of satellite constellations which improves accuracy even further.”

Some of the older technology is still used on farm, with a StarFire 6000 and a 2630 fitted to a John Deere Gator for Avadex and slug pellet application, while the older StarFire 3000 along with a second 2630 provide guidance on a Honda ATV. “The operators wouldn’t be without them so it’s amazing how this older technology is still being used today.”

On the whole, the farm has been an early adopter of precision technology,



## Connecting the dots

**John Deere’s Operations Center provides customers with access to a wealth of information in one place, including machine data, licencing information, remote assistance and operator manuals.**

says Andrew. “Luckily my father has been proactive and keen to take on new tech to explore the benefits it can bring to the business. He’s 79 now and is great with the technology generally.”

Andrew has integrated the technology with the business but connecting all of the different forms together has been one of the hardest elements. “Other challenges have included shading from obstacles such as trees, and while this is still the case it’s massively reduced compared with what it used to be. In addition, the accuracy we can achieve now is so precise.

“The technology has influenced us moving towards shallow tillage, providing the tools to quantify costs, giving us confidence in the accuracy of our figures and improved productivity no end. All these small areas of improvement added together result in significant benefits, and while the technology all costs money, those benefits outweigh what we’d lose if we didn’t have it.

“We know farming is going to be increasingly data-driven and there’ll be even more to be gained from adopting new technologies as they emerge,” he concludes. ●