

Seizing spray windows



On Farm Opinion

The UK is seeing fewer and fewer ‘perfect’ spray days, so being ready to utilise any weather window that comes along is increasingly important. CPM speaks to a farm manager whose investment in a new self-propelled sprayer with pulse width modulation is paying off.

By Melanie Jenkins

With almost 20 years of experience as a sprayer operator under his belt, farm manager at Maces Farms, Mark Gemmill, knows what he wants from his sprayers. Having recently purchased a Chafer Interceptor with a 30m boom, he details how investing in technology is paying off on farm.

Based on the Quendon Estate in Essex, the farm consists of a traditional arable set up over 1100ha, growing wheat, winter barley, winter beans, oilseed rape, sugar beet and spring or winter oats, depending on the year.

Mark started out as a sprayer operator on the farm and having come from a farming

family, when the opportunity to manage the farm came up, he jumped at it. “The previous farm manager left a year ago and naturally, I wanted to step up and embrace the challenge plus it’s such a nice farm and the surrounding countryside is beautiful,” he says.

Soil health

He runs the farm as a minimum tillage operation, and being both BASIS and FACTS qualified, he incorporates a soil health strategy into his management. “I farm every field differently where I can. The farm does have variable soil types, ranging from medium to heavy clay over chalk, as well as some silt in places. A lot of the soil doesn’t require drainage as it’s all ground water which permeates through the chalky layers, so the farm really just has to be managed according to soil type.”

Including himself, Mark employs one full time member of staff — Beau Rollings — and three seasonal workers in the summer. “This does mean there’s sometimes a compromise on what we can do, but my emphasis is always on quality and making the most of weather windows.”

Mark runs two John Deere tractors, a crawler which is used for cultivation and drilling and a wheeled machine for all the main work. “Between the minimal kit and staffing, this is why running a self-propelled sprayer is so important — and it’s vital to have kit that’s efficient and that I can rely on.”

Previously, the farm ran a Bateman RB35 sprayer, but in 2021 Mark started looking for

“ PWM is a game changer – this is something I say to everyone. ”



Farm manager at Maces Farms, Mark Gemmill, purchased a Chafer Interceptor in 2021 to introduce individual nozzle control and pulse width modulation to his system.



The ePlumbing system detects if valves are open or closed and also to the nearest degree.

a replacement. "The Bateman was reasonably specified, with a Norac levelling system, 10 section control and auto shut off," he says. "It's always a risk leaving what you know but having decided to purchase a Chafer Interceptor as the replacement, I've been impressed with the fluidity and simplicity of it."

Drive system

The Interceptor has a 240hp 6.1-litre Stage V Deutz engine, coupled to a Bosch Rexroth hydrostatic drive system, explains Chafer's Ben Bryant. "This is slightly different to other hydrostatic systems because of the way it's controlled — it runs like Fendt's Vario transmission tractors, so the drive system is the only element commanding the engine rpm. The operator doesn't have to decide on rpm, they just have to drive the machine and the revs are all automatic, saving on fuel and noise. Additionally, despite being hydrostatically driven, the machine can maintain speed whether you're going up or downhill without operator input."

In terms of traction control, rather than just removing drive from the wheels when they spin, the system on the Interceptor slows the wheels down, he says. "This can be really helpful, especially in years like this one where it's so wet, because it means all four wheels are trying to travel at the right speed."

Having previously had 10 section control, one of the reasons Mark opted for the Interceptor was to improve on this. "I wanted the next sprayer to have individual nozzle control and auto shut off as a step up and to help with cost saving. Individual shut off meant we could remap all of our working areas, and we're physically ordering less chemical product now, so it's definitely helped cut costs."

He's also observed an improvement in crop health due to a reduction in overlaps. "This has helped us to be more accurate, which has resulted in less scorch especially with some mixtures."

As Mark uses MyJohnDeere, he wanted a sprayer which could be compatible with it, and ▶



The PWM system is in control of its own liquid flow and because this is pulsing 15 times per second and adjusting the on/off time or duty cycle, this helps with turn compensation so that exactly the right amount of product is being applied.

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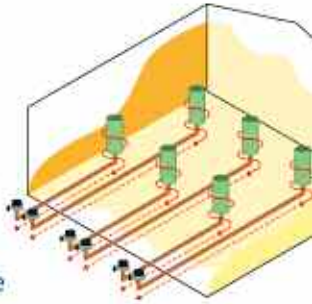
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Air Purge – part of the ePlumbing system – uses compressed air to blow all but about 3 litres of residues out of the boom.

▶ because Chafer could honour the system in the cab and back it up in case anything went wrong, he felt this was beneficial.

Opting for pulse width modulation (PWM) on the Interceptor was no small decision for Mark, as it added a £30,000 price increase. “It can look hard to warrant on the face of it but on visibly seeing how it operates in the field, it’s justified. We’re getting fewer spray windows in this country — if you worked out the number of perfect spray days compared with your workload for the year, it just won’t add up, so this means it’s even more important to be conscientious with what you’re doing.”

Game changer

“PWM is a game changer — this is something I say to everyone,” enthuses Mark. “If this wind picks up, you can just drop the pressure and carry on. Traditionally, you’d have to finish that load and then stop the sprayer and reset everything, but with PWM it’s adjusted at the touch of a button.

The sprayer is fitted with the only nozzles suited to PWM, the TeeJet twin air induction nozzles. “Because they’re twin jets, this means they’re more prone to drift than standard air induction, so we have to be careful, but with the flexibility to turn the pressure down we can

reduce drift,” he says.

And the system works both ways, meaning increasing the pressure can be used to manipulate the droplet size, says Mark. “PWM gives us such great flexibility that it doesn’t make sense to me to not have it now.”

The Interceptor is fitted with a Gen 2 Raven Hawkeye system, which operates individual nozzle shut off and individual nozzle rate control, says Ben. “This means that each nozzle in the PWM system is in control of its own liquid flow and because this is pulsing 15 times per second and adjusting the ‘on’ and ‘off’ rate, this helps with turn compensation so that exactly the right amount of product is being applied.”

With around 80 fields — not many of them square — Mark calculates that roughly 20% of the farm is headlands. “This means that at least a fifth of our spray applications benefit from PWM and turn compensation because as you go around a corner the speed of the outer boom increases, and on the inner, it decreases. This system changes your duty cycle, so as long as your operation is steady and you’re monitoring the screen, then you can be reassured that the application on the curve is performing as well as it would on a straight line with a conventional sprayer.”

Because the PWM and

individual nozzle control functions are integrated with MyJohnDeere through ISOBUS, Mark is going to introduce variable rate nitrogen to the system for the first time this year. "I changed my fertiliser strategy when the price increased, moving to two passes with granular and a final with liquid nitrogen. Our final pass this year will be applied variably because our sprayer technology now allows us to do it.

"As the farm has such variable soils, I believe it's worth doing. If it works and we observe a noticeable difference it could help to push our yields on," he adds.

Speedy adoption

Ben acknowledges that PWM has become a lot more popular than first anticipated. "We thought that this technology would be sold on the top 10% of machines, but it's actually more like the top 35-40%. The original selling point of the system was the turn compensation and the ability to adjust the pressure, but once we developed it alongside Raven Hawkeye, we found that the application rate was so consistent that this became the most appealing aspect."

One element of the Interceptor which has really impressed Mark is the ePlumbing system. "The plumbing is an element that drew us to the Chafer machine and the system is probably one of the best ones I've operated in my career. The usability within the cab is great — you can do exactly the same from the cab as you can do stood by the induction bowl."

Sold as an option for the machine, ePlumbing doesn't just detect if valves are open or closed but also to the nearest degree, says Ben. "If there are any issues, there's an alert in the cab, and there's also a failsafe built in. If a valve were to fail, there are two separate ways to continue using the machine despite the faulty part. The system also provides automatic filling, dilution and wash out."

Air Purge — part of the ePlumbing system — is an aspect Mark was unfamiliar with before buying the sprayer. "I didn't really take the concept on board but once I started working with it, it became clear just how well it allows you to look after the system. Using compressed air, it blows all but about 3 litres of residues out of the boom, which can be as much as 70-80kg of liquid."

Mark confesses that he's a stickler when it comes to good housekeeping, and so the system has provided him with peace of mind. "I'm obsessed with keeping the sprayer clean and probably rinse five or six



The Interceptor is fitted with a Gen 2 Raven Hawkeye system, which operates individual nozzle shut off and individual nozzle rate control.

times, not just the recommended triple rinse. Good housekeeping will allow you to keep spraying and although we had a few

blockages in the first year because the PWM system is quite sensitive, and we had an issue with zinc where the density was ▶

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Beau Rollings, sprayer operator at Maces Farms, is new to PWM but wouldn't want to use a different system now.

► high. But because of the Air Purge system, it's easy to clean out in the field if you have to. And I've learnt that as long as you keep the PWM really clean, there are no issues."

At 5000 litres, the tank on Mark's Interceptor is bigger than on his previous machine, but he doesn't think he'd go larger, purely because of the weight. Another change he made was to opt for a single size tyre for use all year. "I decided to go for 540/65 R38 tyres to help save on costs and labour, whereas previously I'd run winter and summer tyres, which had involved changing and paying for two sets of tyres. Because these are taller tyres than before, there's a greater surface area spread, so it's a choice that has worked on farm."

Boom levelling

In addition, Mark upgraded to Norac Active Wing Roll UC7 boom levelling control. According to Ben, the Interceptor's boom back frame is controlled by airbags to provide cushioning with hydraulic rams as dampers. "This is built around the idea that if a machine has done 10,000 hours, the back frame will still perform the same so the ride will remain consistent irrespective of use."

Mark opted for a five-year warranty with the Interceptor, something he tries to do with most machines. "We run everything so tightly and we just don't have the resources to fix problems ourselves and if a machine

breaks down, we want it fixed as soon as possible. And having a longer warranty guarantees fixed costs over that length of time. It's all about making good decisions and with the PWM, it's an electrical system with 60 modules, each being £200-£300 to replace if anything goes wrong, hence the warranty."

Ideally, he'd realistically like to run the sprayer for 8-10 years to make the numbers add up. "A key thing is the reliability, and the real test will be after it's five years old. But if it's reliable and is in good order, then should we have to spend money on it after this point, it could still add up."

For longevity and reliability, every nut and bolt on the Interceptor that isn't in a high tensile situation, is made of stainless steel, says Ben. "The tank and spray lines are all stainless steel and this helps with liquid fertiliser and also means that even on a 15-year-old machine, the bolts shouldn't be seized up."

Looking ahead, Mark would like to invest in boom cameras. "I'd like to be able to apply glyphosate pre-drilling using 'green on brown' camera recognition technology, as to cut back on our inputs of that would be a game changer in terms of cost." ■



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