

The most overlooked component on the sprayer

On a recent visit to Lechler's headquarters in Metzingen, Germany, via UK distributor On Point Spraying Solutions, Daniel Hodge found it clear that what appears to be a simple plastic tip is, in reality, a highly engineered, tightly controlled component.

It's easy to overlook a spray nozzle. However, it's a component that sits right at the sharp end of application accuracy, and, arguably, one that deserves far more attention than it currently gets.

On most farms, it's treated as a consumable, something small, relatively cheap, and ultimately disposable. When performance drops off, it's swapped out without much thought. Compared with the scale and cost of the sprayer itself, or the sophistication of modern rate control and guidance systems, the nozzle rarely gets centre stage. But, spend time inside Lechler's HQ, and that perception quickly starts to unravel.

A specialist in a generalist market

Lechler is not a machinery manufacturer branching into application technology, nor a broad agricultural supplier with a nozzle range as part of a wider portfolio. It is, quite simply, a nozzle company. Founded in 1879, the business has evolved into a global specialist focused entirely on spray technology, with its agricultural division forming a key part of that offering. While production for other industries has expanded globally, including recent increases of capacity in India, the agricultural nozzle manufacturing remains closely tied to its German base.

In a market where many components are designed to be 'good enough', Lechler's approach is rooted in precision, repeatability, and long-term development. As Andreas Bahnmüller, head of agriculture at Lechler put it during the visit: "If it was easy, anyone would do it." It might have been a throwaway comment, but it's one that neatly captures the mindset behind the business.

From plastic tip to precision instrument

At a glance, a nozzle is not much more than a small moulded component. In reality, it is closer to a calibrated measuring device. Production at Metzingen runs around the clock, with automated lines operating 24/7 to ensure consistency at scale. The process begins with injection moulding, using carefully controlled material blends, and, in many cases, incorporates ceramic elements to improve wear resistance and maintain performance over time.

Tolerances are extremely tight – narrower than a human hair – so even minor deviations in internal geometry can alter flow rate, droplet size, and spray pattern. In practical terms, that means the difference between accurate application and inconsistent coverage can come down to fractions of a millimetre. And critically, especially when the scale of



production is considered, that precision has to be very repeatable.

As Andreas explained while walking through production, "If you have a box, you should have 100% of good parts... otherwise the process stops." Assembly is equally controlled. Injectors, seals, and internal components must align perfectly, with automated systems ensuring each unit is built to the same specification. Quality control is embedded throughout, with full traceability and material tracking integrated into production systems.

It's a level of manufacturing discipline that sits in stark contrast to how the end product is often perceived on farm.

Inside the lab

If the factory shows how nozzles are made, the laboratory shows why they work.

Behind the production lines sits a network of test rigs and measurement systems that feel closer to a research facility than a typical agricultural setup. This is where nozzle performance is defined,



A snapshot mid-cleaning cycle, with a special clear demonstration bottle fitted to the XAMOUNT unit.



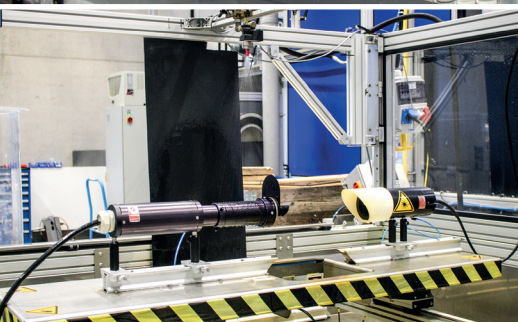
Injection moulding machines run around the clock, 24/7.

Andreas Bahnmüller, head of agriculture at Lechler.

Larger test rigs allow measurement of how nozzle outputs interact with each other.



Advanced laser-based imaging rigs capture images that show individual droplets.



verified, and, just as importantly, challenged.

At the most fundamental level, everything comes back to liquid distribution. Using dynamic test benches, engineers measure how spray is distributed across a given area, building up a detailed picture of how evenly product is applied. These systems can operate in both static and moving configurations, simulating real-world conditions and capturing data across the full spray width.

For deeper analysis, the team moves into three-dimensional mapping, measuring distribution point by point to build a complete profile of how liquid is deposited. Droplet size, one of the most critical factors in both efficacy and drift, is measured using laser-based systems that effectively freeze the spray in motion.

High-speed imaging captures droplets as they pass through a calibrated measurement zone, allowing the system to calculate their size with remarkable precision. But even here, the limits of measurement are acknowledged.

Philipp Würdinger, team lead for measurements at Lechler made the understated comment: "Droplets are not that easy to measure." And, that matters, particularly when it comes to drift classification. Achieving a 90% or 95% drift reduction rating isn't simply a design claim, it must be backed by measurable droplet size distributions that fall within defined ranges.

Beyond individual nozzles, larger test rigs assess how multiple nozzles interact across a boom. "The other things are simulations. This is the real measurement," Philipp added. In other words, it's not enough to know how one nozzle performs in isolation, what matters is how they work together in the field. What became clear very quickly is that development is continuous. "It's never finished... everything is in movement, all of the time."

Why it matters in the field

All of that precision ultimately serves a simple purpose: putting the right amount of product, in the right place, at the right time. The nozzle is the final point of delivery in the application chain. Regardless of how advanced the sprayer is, whether it's equipped with GPS guidance, variable rate control, or section switching, the quality of application is dictated at the nozzle.

Droplet size, spray angle, and distribution pattern all influence:

- Coverage and efficacy
- Chemical usage
- Drift and environmental impact.

Inconsistent nozzles can lead to uneven deposition across the boom, resulting in under- or over-application.

IDTA: evolution through design

Lechler's IDTA nozzle is a good example of how design has evolved to meet these challenges.

Introduced around a decade ago, the asymmetrical twin flat spray design splits the spray pattern into forward- and rear-facing components – typically around 30-degrees forward and 50-degrees rearward. This configuration improves coverage at higher speeds while maintaining drift control. Drift reduction of up to 95% is achievable with certain sizes, with others delivering around 90%, depending on specification.

But more importantly, it works in practice. Lechler and On Point say that feedback from operators has been consistently positive, with the IDTA becoming a go-to option for pre-emergence applications and drift-sensitive work. It's not a dramatic visual change, but it represents a clear step forward in how spray is delivered.

Consistency at scale

Walking through the factory, what stands out is not just the complexity of individual components, but the emphasis on consistency across millions of units.

Production flows from raw material through moulding, finishing, and assembly, before moving into automated packing and distribution systems. Scrap material is tracked and recycled, with every stage monitored to ensure repeatability.

Seasonality adds its own challenge. As Andreas put it: "Spring is approaching, and the farmer knocks on your door and says, 'I need this now.'" Demand is

unpredictable, making stock management critical – particularly for distributors such as On Point in the UK.

Another interesting detail is that not all nozzles leaving the factory carry the Lechler name. Private label production means many farmers may already be using Lechler-made components without realising it.

Closing the loop

While nozzle design focuses on application, Lechler's newer developments are also addressing what happens before the product reaches the boom. The XAMOUNT closed transfer system is designed to improve the transfer of crop protection products from canisters into the sprayer, removing the need for manual pouring.

Using a vacuum, the system extracts product directly from sealed containers. It can perform full extraction or precise partial dosing using integrated weigh cells, allowing operators to specify exact volumes based on product density.

Accuracy is a key benefit, particularly for high-value or sensitive applications, but just as important is automation. "He can do something else while it's doing that, he doesn't have to stand there," says Alexander Laub, product manager at Lechler.

Once started, the system handles extraction, rinsing, and internal cleaning with minimal input, freeing up operator time and reducing exposure to chemicals. There are also efficiency gains with less waste, lower water use, and more consistent dosing.

It's an extension of the same philosophy seen in Lechler's nozzle design: remove variability, increase precision.

Rethinking the small things

It's easy to focus on the big-ticket items in modern agriculture – tractors, sprayers, combines, and the technology that underpins them. But, as this visit made clear, performance often comes down to much smaller components.

The nozzle may be one of the least expensive parts of the sprayer, but it is also one of the most influential. It dictates how product is delivered, how effectively it performs, and how much is used. Treating it as disposable doesn't quite do it justice.

As pressure continues to build around cost, efficiency, and environmental impact, that perspective may need to shift. Because in the end, precision spraying doesn't stop at the boom – it starts at the nozzle. **FG**



Richard Riley and Dawn Boulton of On Point Spraying Solutions, Lechler's UK distributors.