KUHN Precision Fertilizer Spreaders

InfoAg 2017

KUHN Fertilizer Spreader Lineup

MDS

- Mechanical drive
- Up to 4,000 lb capacity
- Twin spreading discs with adjustable flat-rate spreading
- Up to 80’ working width

AXIS

- Mechanical drive
- Up to 7,050 lb capacity
- Twin spreading discs w/ electronic speed match for precise rate control
- Up to 138’ working width
- Section control

AXIS H-EMC

- Hydraulic drive
- Up to 9,260 lb capacity
- EMC technology with variable-rate capability
- Up to 164’ working width
- ISOBUS-controlled Opti-Point, Vari-Spread, and border spreading

AXENT

- Self-contained hydraulic drive system
- Up to 28,000 lb capacity
- Same technology as AXIS H-EMC
- Standard drawbar suspension and weigh scales

Precision Spreading Principles

Precision dosing of the fertilizer amount
(Application Rate)

Precision in-field distribution of fertilizer
(Spreading)

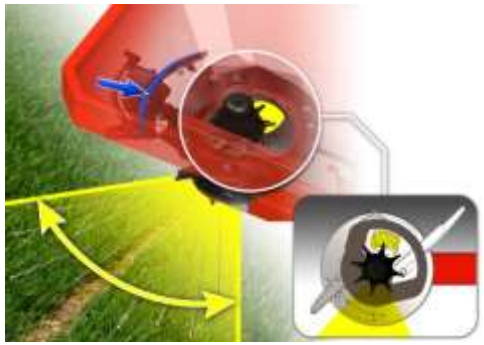
EMC System

- Electronic Mass Flow Control (EMC) system includes hydraulically driven spinner discs with electro-magnetic torque sensors to determine the rate of material falling to each disc
- Compares the measured rate to the rate set by the operator or prescription map
- If rate does not match, it automatically compensates by opening or closing the metering gates
- Adjustment is done every second to achieve at least 98% rate-control accuracy
  - ✓ **Maximum of only 2% over-application, saving money on fertilizer**
- Will adapt to changing field speeds to maintain the desired rate

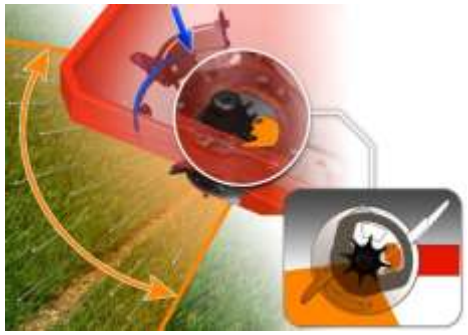
- This system eliminates the need to use weigh scales for rate control
- KUHN spreaders use weigh scales for documentation purposes and to help operator anticipate reloading

Rate Adjustment (Drop Point)

NARROW WORKING WIDTH

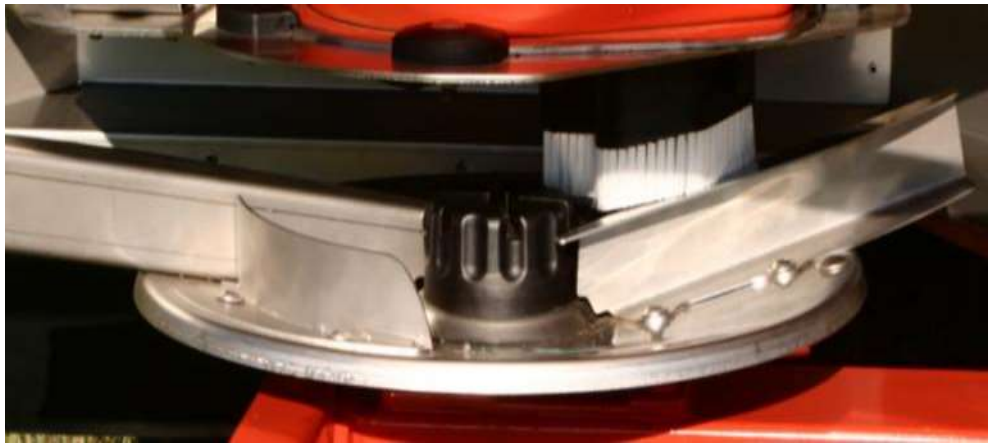


WIDE WORKING WIDTH

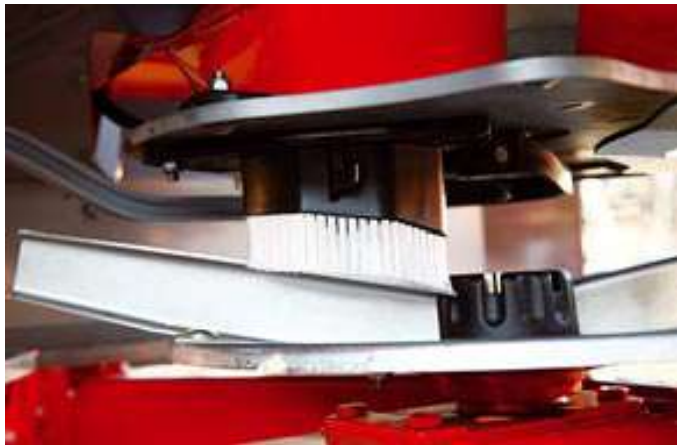


The fertilizer’s overall spreading width is set by inputting data from spread charts or a pan test. A key input is the drop point. As the AXIS design allows for fertilizer to always fall on the center point of the disc, the drop point determines if the fertilizer falls early or late onto the disc. This subsequently affects the overall spreading width. A lower value drop point typically indicates a narrow overall width and a higher value indicates a wider width. Note that when engaging border spreading or section control, the drop point is changed. In automatic mode, the drop point will change automatically to adapt to the situation.

Drop Guide



Drop Guide with disc removed

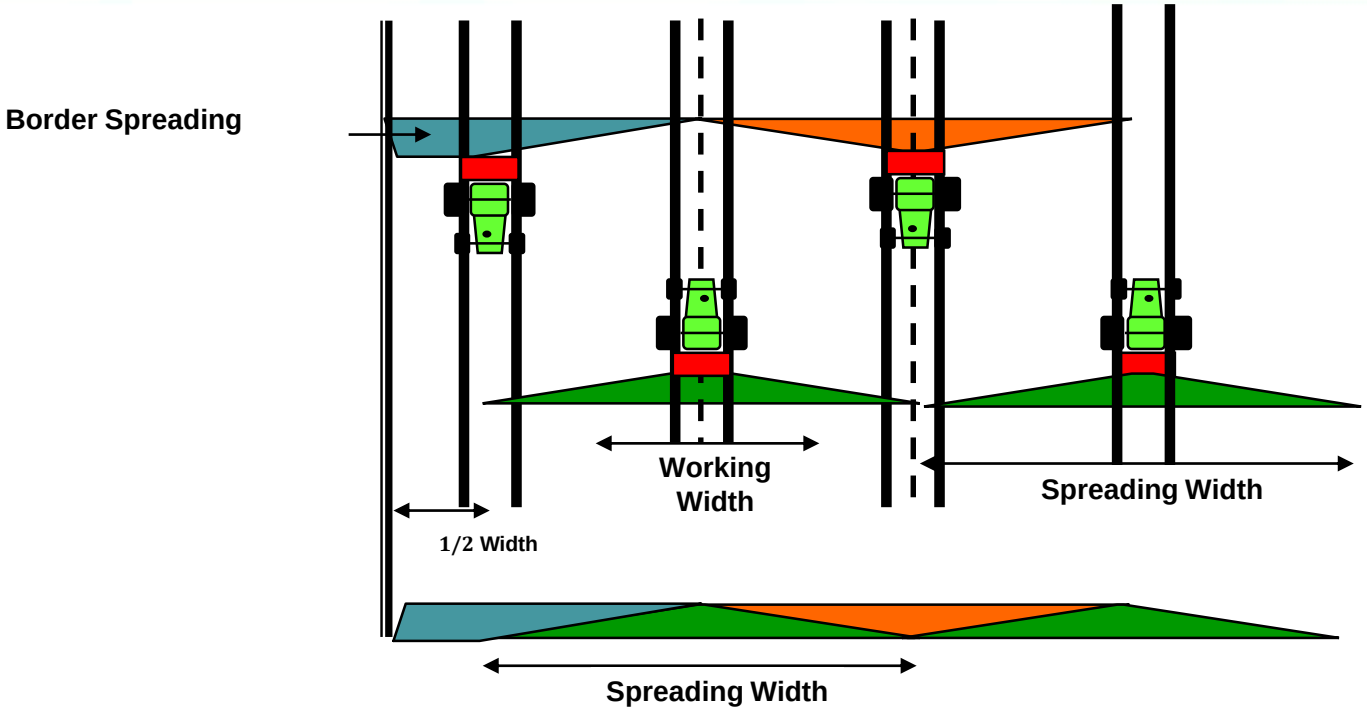


- Drop guide completely surrounds the path from the drop point to the disc
  - ✓ Keeps turbulent air from altering the placement of the granules on the disc
- Brush further blocks air and keeps disc paddles from shattering granules

Spreading Discs

- Each disc uses a long and short paddle to create a consistent pattern across the entire working width
- Curved blades (Airfins) reduce turbulence to avoid disrupting the granules
- Multiple disc sizes match up to a range of working widths, depending on the material
  - ✓ S2: 39’-59’
  - ✓ S4: 59’-91’
  - ✓ S6: 79’-118’
  - ✓ S8: 98’-138’
  - ✓ S10: 118’-157’
  - ✓ S12: 137’-164’

Triangular Spread Pattern



- **Total spread width is actually much wider than the set working width**
  - ✓ For example, if the working width is set to 120’ the discs actually throw material up to 200’ or more, creating the triangular pattern. This pattern is “filled in” with the next pass for a consistent pattern across the full width of the field
- **Excellent spreading in high wind as the application overlapping zones greatly reduce “strips” of missed fertilizer due to wind shift**

ISOBUS Compatibility

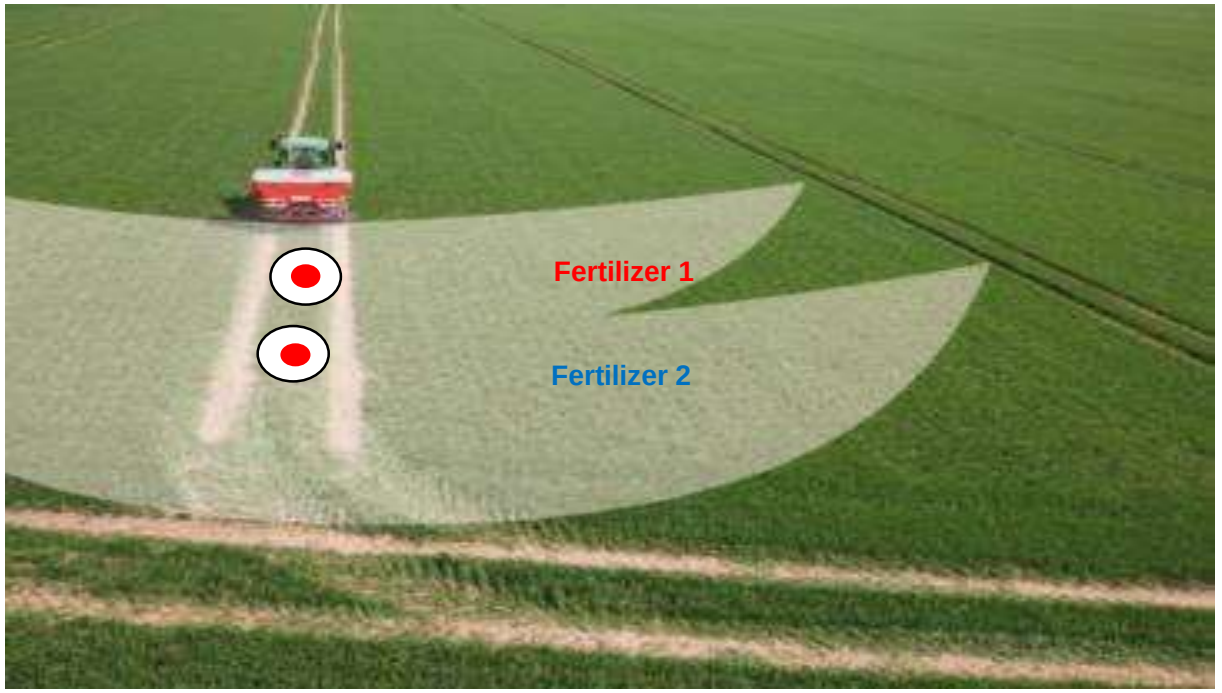
- Plug-and-play ISOBUS compatibility
- Operator can switch views between GPS maps and spreader functions on single monitor
- Accommodates multiple terminal setups for dedicated mapping/spreader screens
- Allows for creation of precise “as-applied” maps using the on-board weigh scales coupled with GPS
  - ✓ Important with environmental regulations continuing to tighten

* Please check the AEF website for a complete list of certified terminals.

Standard Variable Rate

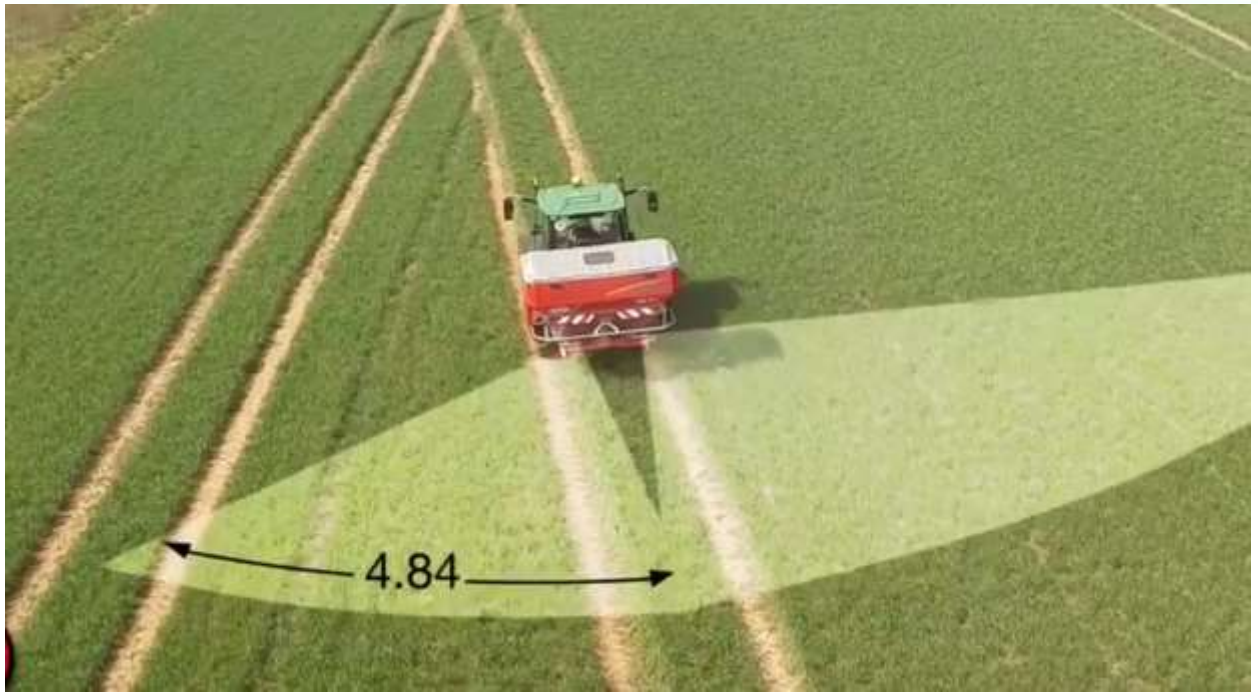
- Accepts variable-rate maps in ISOXML or SHP file formats
- Separate rate controller is not needed (around a $3,500 savings)
- Capable of variable rate at left/right discs independently
  - ✓ Allows even more precise control as management zones change
  - ✓ Reduces input costs incurred from applying a higher rate where it is not needed

Opti-Point



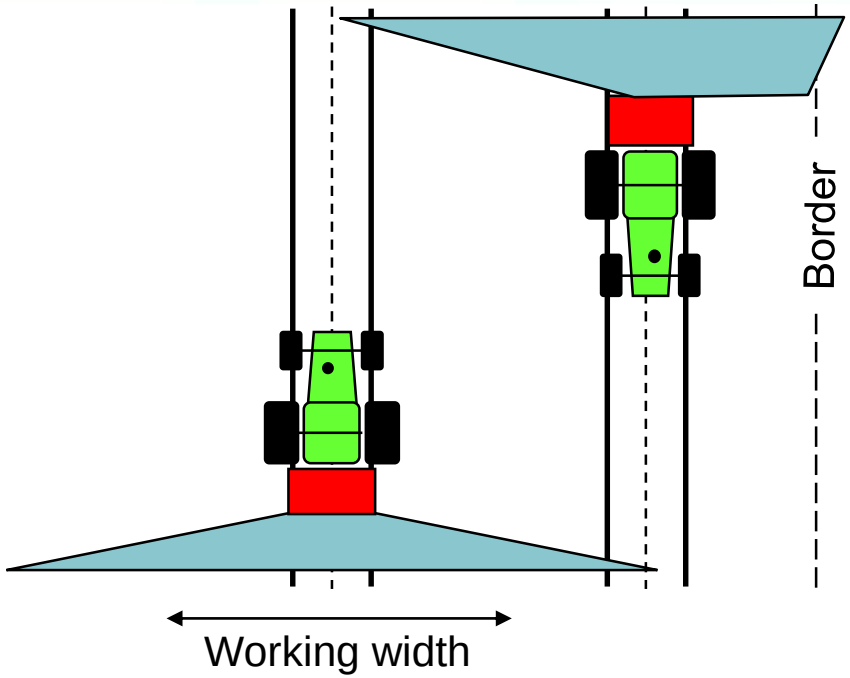
- Opti-Point turns the spreader on and off automatically as it enters and exits the headland
- The on/off points are set when configuring the fertilizer into the terminal at setup
- The turn-on/off times are different for each fertilizer
- Opti-Point simplifies operations for drivers and protects against over- or under-application at headlands

Vari-Spread Dynamic (Section Control)



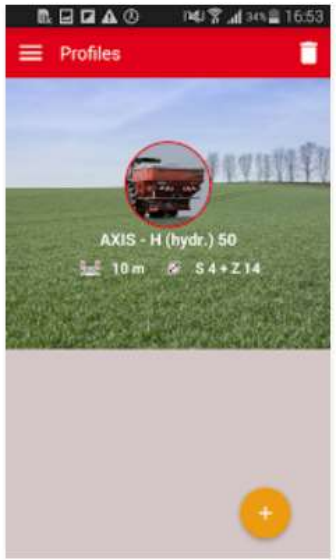
- Capable of section control as standard for reduced fertilizer waste and over-application
- In manual mode, 4 sections per side are selectable (8 total)
- Automatic mode controls the drop point and disc speed constantly for a continuously variable spread width
- Allows for better overlap control in odd field shapes and wedges
- Vari-Spread Dynamic requires Section Control activation from the controlling terminal

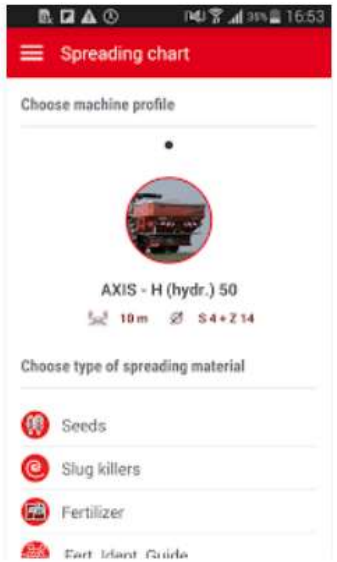
Border Spreading



- Border spreading reduces disc speed and/or drop point so little or no fertilizer is spread beyond the edge of the field
- Can be engaged on either the left- or right-hand side via the control terminal
- Two modes for border spreading
  - ✓ Full (yield) border mode: a small amount of product may go past the edge of the field, but all crop receives the full rate
  - ✓ Limited (environmental) border mode: no fertilizer goes beyond the field edge, but the last rows on the outside may not receive full coverage (important in areas with stringent fertilizer regulations)

Easy Setup





- All fertilizers and seeds have specific charts developed
- An operator can easily input settings into the control terminal
- Once entered, the on-board computer will remember and it can be easily selected again
- Provided ID guides and charts in both metric and imperial allow for quick fertilizer ID
- An operator can then select based on that material and desired spreading width
- SpreadSet® mobile application allows the same look-up capabilities and includes seed settings
- SpreadSet can be downloaded on both Android and Apple devices

Return On Investment (ROI)

What do we gain from all of this precision technology?

- At least 98% rate-control accuracy => less than 2% over- or under-application
- Wide working widths to finish fields quickly
- Significantly reduced fertilizer, fuel, and labor costs

Outstanding return on investment!