
WHITE
PLANTERS
THE ART AND SCIENCE OF PLANTING PERFORMANCE

To meet the needs of a growing world we must get more yield from the same land. While seed technology, fertilizer and irrigation can help produce higher yields, there is no replacement for getting seed in the correct location acre after acre.

White Planters has a long and proud tradition of achieving accurate planting with minimal downtime, wear or required maintenance. Over the course of several decades, we have studied, designed and refined the mechanisms and results of planter performance. It has been our goal to use the best innovations and proven designs to give farmers accuracy, dependability and ease of use.

The aim of this booklet is not to convince you solely of our current approach or our future approach to planter design. Rather, we will present the different component elements of planter performance and discuss the benefits associated with each. Our hope is that this will give you insight into the different elements of planting and planters, and points to consider when purchasing a planter; allowing you to make the best decision for your operation.

We don't pretend to have every answer or the best solution for every need. We do, however, believe an informed customer is a good customer and this booklet will give you deeper insight into planter and planter design.

We want you to be well informed before making your next your next purchase of a planter.

**A planter may be the most important purchase you make for your farm. Make sure you're asking the right questions about how each design will meet your needs.**

1. SEED METER
    - PRESSURIZED AIR OR A VACUUM METERING SYSTEM?
    - TYPE OF DRIVE SYSTEM?
2. MATCHING SEED DISCS TO HYBRIDS?
3. WHAT POSSIBLE DELAY POINTS EXIST FROM WHEN THE SEED LEAVES THE DISC UNTIL IT REACHES THE GROUND?
4. DEPTH CONTROL SYSTEM?
5. WHAT TYPE OF DOWN PRESSURE SYSTEM?
6. HOW IS DEPTH CALIBRATED AND MONITORED ON THE ROW UNIT?
7. WHAT IS THE EFFECTIVE SPEED RANGE FOR THE PLANTER WHILE MAINTAINING PEAK ACCURACY?
8. CAN THE PLANTER CHANGE HYBRIDS ON-THE-GO?
9. WHAT MECHANISM IS USED TO OPEN THE SEED TRENCH?
10. WHAT WEAR PARTS ARE REQUIRED AND WHAT ARE THE REPLACEMENT INTERVALS?
11. WHAT IS THE WARRANTY COVERAGE?
12. TO WHAT EXTENT CAN THE PLANTER BE MODIFIED FOR SPECIFIC NEEDS?

Let's take a look at the functionality and the functions performed by a planter.

# METERING & SINGULATION

Singulation accuracy can be best evaluated through its core activities. Seed is:

1.) picked up and retained on a seed disc and

2.) singulated to one seed per space.

Designs for picking up and retaining seed can be accomplished by applying a vacuum though holes in the seed disc, or by applying pressurized air on the seed side, securing seed to the seed disc holes where air escapes.

Vacuum based planters have been shown in particular circumstances to have a wide latitude in the size and shapes of seed they can singulate. The vacuum design is the most widely sold design among planters.

Positive air planters also have unique advantages. A positive air system typically takes less energy to secure the seed to the plate and is therefore less susceptible to air leaks. Positive air planters also do not require the many seals featured in vacuum-based planters and generally have less wear parts. They are well suited for consistent sizes and shapes of seeds.

For singlulating seed, different designs use brushes, wheels and discs to get down to one seed at a time.

Depending on meter design, some singulators are adjustable to provide proper singulation of seed. In these instances, it is important to have quick and easy access to the singulator to allow for proper adjustment. If adjusting the singulator requires excess work, such as removing the meter from the row unit, proper adjustment can be at risk, so optimal performance may not be achieved.

## METER TYPE

Currently there are three primary types of meter drives – chain and sprocket, flex-shaft or cable, and electric.

All three systems offer benefits in different ways. The chain and sprocket is a simple mechanical method that has been utilized for generations. The flex-shaft eliminates the need for lubrication and is not prone to being damaged by loose debris. The electric drive provides great versatility in allowing individual meter control. This generation of electric drive systems are relatively new in North America but are gaining strong acceptance. With electric drive meters, each row unit acts as an individual planter and can adjust to varying ground speeds when planting in contours. This keeps seed spacing consistent across the entire width of the planter in all conditions.

# SPACING

After the seed is singulated it is released down the seed tube and placed in the ground. The timing of this process is crucial and any hesitations or interruptions in this process results in inaccurate spacing. As the planter is moving at over 5 mph and dropping up to 20 corn kernels per second, minute discrepancies in timing are multiplied many times to become dramatic impacts on spacing.

The two areas that can dramatically affect seed spacing after singulation are the release of the seed from the singulator and the seed travel down the seed tube. Some designs release the seed in free-fall from singulation while others convey the seed laterally or have dedicated mechanisms to move seed from singulation towards the seed tube. Deviations in speed spacing can occur at this point due to interruptions or inconsistencies in the movement of seed.

Similarly, small timing changes due to a seed's decent in the seed tube can also affect seed placement. Seed that ricochets inside the seed tube can be delayed in placement. Additionally, the ricochet action itself can propel seed away from the intended placement in the seed trench.

Manufacturers have tried to minimize seed tube ricochet by designing tubes that compensate for movement, attempt to secure the slide of the seed or encourage the seed to descend mostly untouched.

# MISPLACED SEED IS MISSED OPPORTUNITY.

Multiple studies have shown us the effect of spacing and depth on crop yields. In corn, a change of just 1 inch can mean a loss of more than 2 bushels an acre. In beans, even slight variations in depth can have enormous impact on germination. For the conscientious farmer, accuracy is not a luxury. It's a necessity with bottom-line results.

The best test of a planter's effectiveness is a field check just after the plants emerge. To conduct a field check, simply pull a measuring tape 17.5 feet along a row of emerging plants.*

1. Are there skips or doubles? Where you find a skip, dig up some of the soil to see if the seed simply failed to emerge.
2. Look at the height of the plants. Is it consistent?
3. How many plants are there? Multiply this number by 1000 and compare it to your target population per acre. Count the doubles as a single plant.
4. 50 plants represent one bushel of corn. Take the difference between your target population per acre and your actual and divide it by 50 to find how many bushels you could be losing per acre because of inaccuracy.

*Based on 30-inch row width

## SKIPS & DOUBLES

*Skips and doubles in fields hurt yields by causing two plants to share vital resources or leave precious field space unutilized. A skip indicates a space in a row where seed should have been planted but the plant failed to grow. When a double happens, two plants have to share water, sunlight and space meant for one plant. Although there can be many causes for skips and doubles, a common cause is a problem with the planter, meaning a seed failed to drop at the intended time. Often, skips and doubles are caused by a planter that interrupts and inefficiently moves seed from hopper to placement.*

*When skips and doubles occur due to design, it is likely the problem will persist, causing a reduction in plant growth. A skip in one part of the field may also suggest a double planting in another location.*

*Typical causes of skips and doubles are inaccurate seed singulation by the meter and interruption of the seed drop caused by horizontal movement beneath the meter or ricochet inside the seed tube.*

## INCONSISTENT EMERGENCE

*Plant emergence over a wide range of days hurts the entire farming cycle. When some plants grow faster than others, the tallest plants shade the shortest plants, hurting plant development. Even if the plants that emerged at a later date than others do grow to fruition, they are more likely to have varying moisture content, shifting the harvesting schedule and costing the farmer time and money.*

*Timing of emergence is dependent on accuracy of the planter depth and the proper formation of the seed trench. Inaccurate and inconsistent plant depth can cause variation in the timing of plant emergence as can poorly formed or inconsistent seed trenches.*

## UNEVEN SPACING

*Unevenly spaced plants cause imbalanced distribution of sun and water. Just as doubles cause plants to fight for the same sunlight, water and nutrients, unevenly spaced seed also causes irregular distribution of shared resources.*

*Uneven spacing is typically caused by delays in seed releasing from the meter or falling down the seed tube.*

# DEPTH & DOWN PRESSURE

Depth can have a significant effect on both the success and timing of emergence. While all planters have mechanisms for setting and maintaining depth, the ability to set, manage and calibrate depth does vary across designs. A planter's depth can be impacted by obstacles in the field and different designs have different mechanisms for dealing with these obstacles. Something as simple as pushing through an obstacle or pulling over one can make a small difference in depth, which ultimately effects the consistency of placement and potential for yield.

As the planter moves across varied terrain, the ability to maintain correct down pressure can make the difference in keeping an optimal relationship of row unit to soil. Down pressure can be managed either actively through a system that monitors and adjusts according to conditions, or passively with a fixed adjustment that remains until it is changed.

**Mechanical Springs:** Provide a few fixed positions allowing a farmer to adjust down pressure in increments. Down pressure will vary based on the vertical position of row unit as it moves through the dips and rises in the field. The mechanical spring system has been used on planters for generations.

**Air Down Pressure:** Allows infinite control of down pressure by using air springs. Keeps down pressure consistent on all rows, even when going over uneven areas of the field. Some air pressure systems allow for active adjustment of down pressure based on sensors on the row unit.

**Hydraulic Down Pressure:** Can provide independent down pressure control of each individual row unit based on sensors measuring the correct down pressure needed. Hydraulic down pressure systems are the most reactive of all the systems and are desirable when planting at high speeds.

# SPEED

Increased planting speed is a function of precisely controlling each of the elements handling the seed based on field conditions, and the planter's ability to maintain accuracy in spacing and depth at different speeds. Designs often incorporate electric drive of the meter and active seed tubes to better control the timing and secure the seed. While many growers want to reduce their planting period, planting speed is only one point of consideration. Many other factors impact the time from the first planting day to the last.

The closer to the bottom of the trench you positively hold the seed, the less opportunity there is for interference or deflection of the seed, which causes inaccurate spacing. There are different methods for controlling the seed to the seed spacing in the trench, but all incorporate a positive retention of the seed after it is singulated by the meter. Either a brush or conveyor carries the seed down to within inches of the trench before gravity takes over to do the rest.

# DUAL HYBRID

No seed can address the needs of every piece of ground. Farmers can achieve consistently higher yields by varying the seed types they put in different fields. As long as conditions are uniform across a field, farmers can often match seed to soil. However, when variations exist within the same field, such as variations in elevation, farmers need to be able to switch between hybrids on the go.

Some planter designs can switch between hybrids automatically according to prescription. These prescriptions can be pre-programmed and mapped in advance of planting so the process of switching hybrids occurs automatically and precisely.

As the data intelligence and agronomics become easier to read, write, and transfer among all aspects of the farm, this technology will become far more widespread. We are currently at the early stages and see this as a big opportunity for farmers to increase their revenue potential in the coming years. It will take commitment of machinery manufacturers and agronomic experts to create the needed partnerships to allow this technology to become more widely available.

# OPENING & TRENCH FORMATION

One of the most important functions a planter can perform is the formation of a proper seed trench during opening. A correct V-shaped trench keeps seed secure, in alignment and makes an ideal germination and growing environment.

The design for opening seed trenches varies across manufacturers. While most planters use two discs to open the seed trench, the size and position of these discs can affect the quality of the trench and the usable life of the disc themselves.

# DURABILITY, EASE/COST OF MAINTENANCE

A planter's durability is mainly a function of its materials, design and wear parts. In areas where movement is required, some designs have included features like sealed bearings and ultra high molecular weight polyethylene (UHMW) transitions to reduce and even eliminate service to these areas. Some designs also use castings to deliver a more solid platform and drive consistency from unit to unit.

Openers are often the most frequently replaced and highest cost regular maintenance item on a planter. There are differences between opener designs and even opener sizes that can greatly affect longevity of the opener discs. The larger diameter of disc, the longer they will last.

Like most agricultural equipment, planters have parts that wear out with use. As noted earlier, some planter designs require seals to prevent loss of vacuum. Other designs must replace brushes. In several designs, the meter itself must be overhauled or replaced at certain intervals.

Finally, planters differ in the accessibility to and number of service points on the unit. Some designs have quick access to wear parts while others require more extensive disassembly. Remember that service and maintenance time often take away from the opportunity to be planting.

# MONITORING

Monitoring seed placement is a must in high stakes crop production. Monitoring can help predict yields, troubleshoot issues and alert you to conditions that can cost substantial time, effort and money. Several approaches exist for monitoring during planting. Some designs use optical sensors to monitor seed drop. While these designs can be reliable in many situations, they can be obscured by dirt and dust. Designs that employ radio signals are less vulnerable to dust.

# WARRANTY & SUPPORT

Planters are an essential piece of equipment on a farm and they are expected function at peak performance at all times. Farmers expect quick answers to planting concerns and prompt service to get them back in the field. It is also important to have the backing and peace of mind that longer periods of warranty can provide. It is critical that your dealer and the planter manufacturer have the ability to provide you the backing and support you expect.

# UPGRADES/CUSTOMIZATION

As no two farms are fully alike, planters must be agile in their ability to be customized to the needs of the operation. For many farms, this means the ability to add fertilizer and insecticide options, residue managers, closing options, seed hopper options and the wide array of configurations farmers may seek to match their needs. The ability to upgrade technologies on a planter in the future is also a key capability that may reduce future equipment costs, i.e., upgrading a 16-row planter to a high-speed design versus trading for a 24-row.

It is our hope that this publication will help you make a more informed decision when making your next planter purpose. As White Planters moves into a new era with a new partnership with Precision Planting, new planting options will become available with White Planters. It is our hope that in making your next planter buying decision, you will consider White Planters.

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