Stoltz Mfg., LLC
121 Morgan Way
PO Box 527
Morgantown, PA 19543
610-286-5146

Technical Specification: Site Spreader Verification of Spread Rate (Draft)

Method of Operation: The Stoltz Site Spreader consists of a hopper, conveyor, metering gate, and spreading auger. Material is pneumatically loaded into the hopper from a bulk tanker truck. Site Spreaders are generally outfitted with the Stoltz Spreader Control Center, which consists of a microprocessor and an operating terminal with large display. The desired application rate is entered into the display in lbs/yd^2. Sensors are used to determine the height of the metering gate, the speed of the conveyor, and the vehicle ground speed. These inputs are fed into the microprocessor which adjusts the conveyor speed to achieve the required volumetric discharge rate from the hopper. Manual adjustment to the spreading auger is required to achieve a level spread pattern. The hopper discharge is calibrated by adjusting the Material Calibration Number in the display.

Material Calibration Number: The Spreader Control Center continually monitors the volumetric discharge of the hopper. This volumetric discharge is converted to a ground rate (lbs/yd^2) by the Material Calibration Number. This number primarily represents the density of the material as it passes under the metering gate, as well as accounting for any variations in other factors such as material flow characteristics or slight inaccuracies in gate height or ground speed calibrations.

Limitations: As the Spreader Control Center operates volumetrically and the Material Calibration Number has a fixed value, the spreader does not compensate for changes in material density as the hopper unloads. If the actual product density varies by some amount, the spreader output rate by weight will vary by a similar measure. Variations in product density can occur due to the characteristics of the material itself including particle size distribution, level of aeration, moisture content, or temperature. Non-homogenous materials with varying particle sizes may separate during transportation to the job site and during the pneumatic loading process further exacerbating density variations in a load. Due to these factors, the spreader can never discharge at a rate that is more consistent than the density of the product itself.

Recommendations:

- Once the product is loaded into the Spreader, minimize driving around as bumps and vibrations will tend to settle the product. Try to minimize variations in driving distances between the loading and spreading site for different loads.
- Try to minimize starts and stops during the spreading process.

Verification of Spread Rates: The most accurate method of calibrating the spreader is based on the average weight of product on the ground. As mentioned previously, product density can vary within a single load of product. Spread pattern consistency can vary based on spreading auger adjustments, as well as the flow characteristics of the product. Calculating the spread rate based on the weight of product in a full load and the total area covered by the load is unaffected by these local variations in density or spread pattern. Checking small samples covering a square yard is a useful starting point, but ultimately that sample represents only the sample area. Calculating an average rate on the ground based on the weight of the entire load and the total area covered is effectively using the entire load as a sample and therefore eliminates the effects of local variations on calibration accuracy.

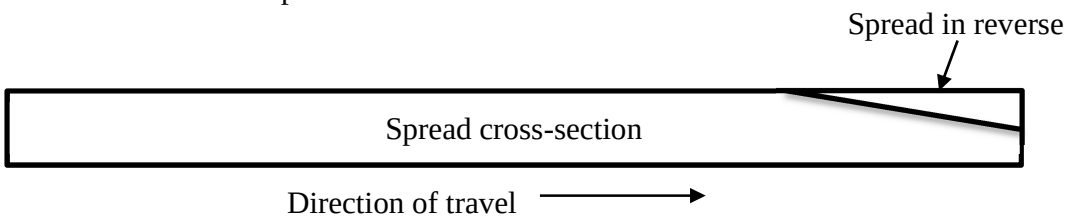
Compare the weigh ticket from the bulk tanker driver with the area that the material is spread over:

1. Mark out an area that the load should cover
2. Spread the load over the marked out area

$$\text{Spread Rate (lb/sq. yd)} = \frac{\text{Load Weight (lbs, from tanker driver)}}{\text{Area Covered (sq. yards)}}$$

Tips for Consistent Spreading: Once the level of material in the hopper falls below the bottom of the gate, the output rate falls and the spreader is no longer discharging a fixed volume of material. This decrease in output rate manifests itself on the ground as a thinning of the product that occurs at the end of spreading every load. This can be dealt with in two ways:

1. Stop the spreader at the end of the marked out distance. The last part of the spread will appear thinner than the rest of the spread run, and some material will remain in the truck. Re-spread the thinned area in reverse. Doing this will overlap the thinned area such that the heaviest remaining application rate will overlap with the lightest initial application rate at the end of the spread run.



2. Retain a small volume of product in the hopper at the end of each load, such that the level never falls below the threshold of the metering gate. In this case, the operator stops spreading the first load before the product level drops below the metering gate, and fills the second load atop the remaining product from the first load (if the volume of the spreader allows this). This ensures that a constant volume of product is always flowing through the metering gate and helps maintain a constant discharge rate by decreasing variability in the amount of product on the ground. Of course, it is important to fully empty the hopper at the end of the day to minimize the possibility of the load setting due to condensation.

Spot Checking the Spread Rate: The spread rate can be spot checked by the following methods. However, it is critical that the spreading auger be adjusted to achieve a level spread pattern for these methods to yield useful results.

Tarp:

1. Place the tarp on the ground about 30 feet in front of the truck. If possible place the tarp slightly off center but ensure that the wheels of the spreader will not touch the tarp.
2. Spread over the tarp.
3. The spread rate is equal to the weight of the material retained on the tarp (lbs) over the area of the tarp (yd^2).

Trays:

1. Place three 1'x3' metal trays on the ground about 30 feet in front of the truck with the long side parallel to the direction of travel. Ensure that the wheels of the spreader will not touch the trays.
2. Spread over the trays.
3. The spread rate is equal to the combined weight of the material (lbs) retained on the three trays.

Load Cells: If the spreader is equipped with load cells, they can be used to double check the spread rate using the following procedure:

1. Mark out a known distance
2. Position the spreader at the start of the marked out distance and note the initial scale reading
3. Spread to the end of spread run
4. Note the final scale reading (make sure there is still some material in the hopper)
5. Calculate the spread rate as follows:

$$\text{Spread Rate (lb/sq. yd)} = \frac{9 \times [\text{Initial Scale Reading (lbs)} - \text{Final Scale Reading (lbs)}]}{\text{Auger Width (ft)} \times \text{Spread Run (ft)}}$$