



**MULTIPLE SECTION CONTROL
ROW PLANTERS, SEEDERS, DRILLS,
AND FERTILIZER SPREADERS
2005
THE DAKOTA LAKES STAFF**

PRECISION APPLICATION and PRECISION SEEDING:

When used relative to application of seed, evaluations must include all of the following:

- 1. The ability of the opener to accurately place seed in a uniform pattern in the soil at an accurate depth.**
- 2. The ability of the opener to press and cover the seed in a manner that allows all seeds an equal chance to germinate and emerge.**
- 3. Predictability and uniformity of differences between seeding rate (target and actual) and final stand.**
- 4. Uniformity of seedling emergence.**
- 5. Uniformity of early growth as impacted by the factors above and by seed trench and side-band fertilizer applications.**
- 6. The ability to accurately meter seed.**

Only when the above criteria are deemed to be sufficiently “precise or accurate” does it make any economic sense to attempt to vary the seed population in relation to geographic position.

Section control to turn off parts of a seeder for the purpose of preventing double planting of seed is economically important even if the ground engaging components are not optimized.

When used in reference to fertilizer or chemical applications, evaluations must include the following:

- 1. Using variable rate techniques when applying fertilizer material with the seed may lead to cases where seedling damage occurs.**
- 2. Using variable rate techniques when applying some fertilizer materials in proximity to the seed may lead to cases where seedling damage occurs. This depends on the spacing, the material, the seed, the soil, weather, and other factors.**

3. Section control to turn portions of the applicator on and off are important from an economic AND an environmental standpoint.

WHAT WE KNOW IN DECEMBER 2005:

Seed is expensive.

Fertilizer is expensive.

Preventing overlap can lead to real savings in seed and fertilizer costs.

Preventing overlap of fertilizer and pesticides makes environmental sense.

Preventing seed skips minimizes pesticide costs.

Controlling seed and fertilizer at the cart located an appreciable distance from the applicator, makes it difficult to assure that the prescribed rate is reaching the desired landscape position.

Controlling seed and fertilizer at the cart located an appreciable distance from the applicator, makes it difficult to accurately gauge section shut off and turn on times.

Controlling seed and fertilizer at the cart limits the number of sections allowed on the bar to the number of primary runs available on the cart. This is normally 1 to 4 runs. This means on a 20 (60 ft) meter bar, the section size will be no smaller than 5 (15 ft) meters and could be 20 meters.

Electric motors work for operating seed and fertilizer meters. The Dakota Lakes Research farm has used this technique since 1996. Rate of seed and fertilizer varied with ground speed of the machine producing a uniform application rate (when moving in a straight line). Manual section control of seed was employed by using two seed meters (Case IH cyclo drum systems) on a bar ranging from 4 to 6 meters in length. In this set-up 4 motors were operated by a Raven 750 controller. Two motors ran the seed drums and two motors operated fertilizer meters located at the air seeder tanks.

In 2005 three AGTRON systems were used to operate 12 Dunkenmotoren motors. These motors controlled 12 JD vacuum seed meters.

The Raven 750 controller operated two motors. One motor metered fertilizer at the CaseIH (Concord) tank and the other operated a seed delivery system that delivered seed to the JD vacuum meters.

As in the past, rate was controlled in response to changes in ground speed of the machine. In 2005, this was measured at the bar. This set-up consequently provided

uniform application rates. Seed could be manually controlled (on/off and rate) in 12 individual sections of 0.5 m each.

Fertilizer was controlled manually both on/off and rate.

Spacing uniformity of seeds was much better in 2005 than in previous years when the cyclo system was used because metering occurred closer in space and time to point of contact with the soil.

The motors normally used 2 amps or less power. They occasionally would draw 4 amps.

The tractor alternator (128 amp) supplied all power for the 14 motors and 4 controllers besides performing its normal design functions. The only modification to the system involved locating three 12 volt batteries on the seeder. These batteries were wired in parallel with the two 12 volt tractor batteries. Locating the batteries on the seeder was designed to minimize voltage drop errors. We are not certain they were needed. Some seeding was done at night using full lights on long runs (0.5 mile). This resulted in a duty cycle in excess of 85%. There still were no problems with having adequate power.

It is my understanding that a can-bus system could operate all of these motors (and many more) from a single computer. This same can-bus system could also monitor other seeding functions like blockage sensors, tank level monitors, pressure gauges, tachometers, etc. We did not pursue this approach because we felt it would be too involved for what we needed to do in 2005.

The standard Dunkenmotoren motors used in 2005 required also using a \$75 US worm gear attachment. This reduced speed 3:1 and changed rotation by 90 degrees. It would be better to obtain an electric motor with a worm gear instead of the planetary gears used in 2005. This would save money and also make attachment almost automatic. It would also allow removing the meter and motor as one unit when cleaning or inspecting the seed tube.

This is a concept that has substantial merit. It could save tremendous amounts of money, maintenance, and time by eliminating the need for chains, sprockets, transmissions, and/or hydraulic drives while at the same time allowing better control. It would also allow placing singulation systems almost anywhere. This is imperative in developing the true all-crop seeder.

A photograph showing the design used in 2005 is on the next page.



Dunkenmotoren electric drive attached to a standard JD vacuum seed meter.