YOU CAN USE CROSS SLOT OR NO-TILL IT, KNOW THE DIFFERENCE

www.CrossSlot.com
DECREASED COSTS
Seed rate is reduced by high germination and emergence. Fuel costs, labor and tractor time – save up to 60%. Capital costs are similar to tillage – operating costs are much less. Machinery replacement and maintenance are less frequent.

DECREASED SOIL DEGRADATION
No compaction – minimal tillage, flotation tires. Low-disturbance drilling reduces moisture loss – otherwise every tillage pass can lose 0.5 in (12 mm). Reduced irrigation frequency from conserved moisture. Stones are progressively buried – not brought to the surface.

DECREASED ENVIRONMENTAL IMPACTS
Less erosion-wind and water – minimum dust and runoff. Reduced irrigation frequency from conserved moisture. Stoms are progressively buried – not brought to the surface.

INCREASED YIELDS
Equal or better than tillage seeding. Excellent emergence and establishment. Banded fertilizer efficiency. Flexible cover-crops established and re-cropped.

INCREASED SOIL HEALTH

INCREASED SEEDING EFFICIENCY
Routine seeding speed is 6–9 mile/hr (10–14 km/hr). More acres (hectares) farmed with the same resources – more profit. More time available for management and choices.
Fertilizer banded with the same disc opener that sows the seeds (true one-pass).

Dry, liquid, gaseous or combination fertilizer banded simultaneously with seeding.

Fertilizer banded at seed depth or deeper. Separated from seed 0.5–2 in (1.5–5 cm).

Fertilizer banding is unaffected by soil moisture, form, residues, or speed.

One pass fertilization, lb/ac (kg/ac) rate up to annual crop requirements with no emergence effect.

Field tested up to 300 lb/ac (330 kg/ha) urea dry fertilizer.

Soil disturbance minimal and confined to sub-surface (non-inversion).

True, one-pass, low-disturbance, no-tillage seeding.

Banding gives even emergence and increased, high quality yields.

Steve Berger at a Larson Farm field day.
Pre-seeding plant residue management is usually not required.
Manages any form, type or quantity of residues with only a depth adjustment.
Residues are replaced over the horizontal shelves by the depth wheels.
No residue enters the seed zone which avoids ‘hairpinning’ – a common problem with other openers.
Existing field residues are retained without redistribution.
Residue reduces rainfall impact and runoff (erosion), reduces evaporation (more soil water) and provides organic matter.
Residues attract earthworms to the slot zone.
Grain crops produce 3–4 tons of residue per acre worth $75–100 in nutrients, moisture and yield gains.
Don’t waste it – use Cross Slot!

Uniform, correct seeding depth is of utmost importance to crop stands and yields.
Achieving uniform seeding depth in no-till fields is difficult because of variable surfaces and soil densities.
Cross Slot drill engineers have superbly mastered this uniform depth requirement.
Each opener is hydraulically controlled to provide the required down-force, up to 1000 lb (454 kg) down-force per opener.
Down-force is independent of vertical adjustments for soil surface variations.

Depth control and minimal soil disturbance provides near maximum seed emergence.
Seeding rates can be reduced due to improved emergence.
Electronic sensors continuously monitor and re-adjust the down force required to maintain the set seed depth.
Automatic down force (ADF) samples 10 times per second and adjusts 3 times per second.

Seeding into 100 bu/ac (6.7 t/ha) wheat residue

Seeding into 100 bu/ac (6.2 t/ha) corn residue

Each opener individually controls seed depth

Each opener is hydraulically controlled

Automatic down force control unit in tractor cab

Constant seed depth = consistent results

RESIDUE MANAGEMENT
CROSS SLOT SEEDS IT ALL

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Pea emergence in dry soil by V, U and Inverted T-shaped slots

Heat units – degree days

% Emergence

0 25 50 75 100

0 60 120 180

Seeding on the previous crop row

Emergence after 3 weeks

Cover crops well established after 7 weeks

Sunflower seeded into wheat residue

Wheat ready for harvest

Cross Slot drill Hoe drill Double Disk Hoe Cross Slot

CROP STANDS

CROSS SLOT DRILLS PROVIDE
AMAZING FIELD RESULTS

PHOTOS ON LEFT

Cross Slot demonstrates its flexibility and ability to seed directly into heavy residue. Spraying was the only preparation required before seeding. The ground was seeded with a cover crop mix of millet, peas, wheat and clover and this was available for cattle grazing going into winter.

PHOTOS ON RIGHT & BELOW

A variety of crops seeded by Cross Slot drills. Cross Slot drills can seed cover crops directly after harvest which provides maximum benefits.

CROP EMERGENCE

PRODUCTION DEPENDS ON
HIGH STAND ESTABLISHMENT

Uniform crop emergence

Uniform crop emergence matters

Emergence comparison graph

Seeding emergence comparison in the dry

Double Disk

Cross Slot

Hoe

Cross Slot seeded winter wheat root growth

July seeding into 3' yellow clover soon after spraying

Wheat ready for harvest

Cross Slot renovated sod pasture

Uniform crop emergence

Photos on left

Photos on right & below

Top Left Photo: One pass crop seeding by Cross Slot.

Left Centre Photo: Winter canola seeded side by side on the same day; Cross Slot drill on the left side and a common hoe drill on the right side.

Seeding rate for both drills was 3 lb/ac (3kg/ha), no fertilizer was applied to either at the time of seeding in a dry-land area of 6-10 in (20-25 cm) annual rainfall.

Left Center & Lower: Photos taken approximately four weeks after seeding.

Right Centre Photo: Cross Slot provides the capability to seed on the previous crop row to capture higher organic matter, fertility and moisture.

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Cross Slot drill Hoe drill

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CROSS SLOT DRILLS ASSURE CROP SUCCESS

Cross Slot Wheat

Cross Slot Canola

Cross Slot Sunflowers

Cross Slot Forage
Cover crops are a useful management tool. Cross Slot drills have seeded cover crops for many years. It is important to get them seeded as early as possible. Early seeded cover crops can be grazed. Grazing winter canola recently provided an estimated benefit of $85–95/ac ($200–230/ha).

Forages (brassicas, specialty grasses) are readily seeded by Cross Slot. Forages provide the ability to increase available dry matter for animal feed. Seasonal forages can be used for summer feed when other grasses have died off.

Sod/pasture renovation is a unique application for the ultra-low soil disturbance Cross Slot opener. Leaving the field surface undisturbed following seeding provides the option to maintain current species while others emerge and grow for enhanced grazing. Sod can be treated similarly to CRP. It can be sprayed and directly seeded. The ability to apply 1000 lbs (450 kg) down force per opener allows sod ground to be renovated or cropped earlier than other openers.

**Cross Slot Special Applications**

**Unique Capabilities**

**Conservation Reserve Program (CRP) Take-out**
- Conservation reserve acreages (CRP) and grass seed production fields require the Cross Slot no-till capabilities of reseeding with very minimal soil and surface disturbance. Rotating grass fields into no-till cropping with minimal organic matter loss becomes a profitable change without soil erosion and fertility periods.
- CRP ground seeded by Cross Slot needs no preparation (mowing, grazing, burning, diskage, etc.), other than spraying.
- CRP conversion crops seeded by Cross Slot have included winter wheat, spring wheat, peas, canola, barley, corn, triticale, oats and lentils.

**Pictures on the Left**
- CRP ground (25 years) sprayed and directly seeded with Cross Slot. No other preparation was required.
- Normal annual rainfall for this dry land area is 12–14 in (30–35 cm).
- Seeding rate was 90 lbs/ac (100 kg/ha) barley and 95 lbs/ac (106 kg/ha) of N banded at the time of seeding.
- This crop yielded 80 bu/ac (4.32 T/ha) of barley.

**Pictures on the Right**
- This 25 year CRP ground was sprayed in May. Winter wheat was directly seeded in early September.
- Normal annual rainfall for this area is 8–10 in (20–25 cm).
- The seeded ground was sporadically covered in low Sagebrush and Rabbitbush. Excellent emergence occurred in two weeks in late September.
- A good stand was established prior to winter.

**Cover Crops, Forages, Sod/Pasture**

**CROP SEED WITH WINTER WHEAT EARLY SEPTEMBER**
- Good emergence in late September
- Well established in September

**PICTURES ON THE LEFT**
- CRP seeded with winter wheat early September
- July cover crop: durum, radishes, lupins, vetch

**PICTURES ON THE RIGHT**
- This 25 year CRP ground was sprayed in May.
- Winter wheat was directly seeded in early September.
- Normal annual rainfall for this area is 8–10 in (20–25 cm).
- The seeded ground was sporadically covered in low Sagebrush and Rabbitbush. Excellent emergence occurred in two weeks in late September.
- A good stand was established prior to winter.
UNEVEN SURFACES
• Each opener independently maintains its set seed depth over dips and ridges.
• Uniform seeding depth is required for even emergence.
• Cross Slot hydraulic down force and parallel linkages provide a full 18 in (45 cm) of vertical motion without losing full surface contact.
• Common openers with spring-loaded down force have uneven seed depth and emergence – shallow in dips and deeper on ridges – resulting in less yield than with Cross Slot openers.

ROCKY SOILS
• Soils with rocks always provide a drilling challenge for ruggedness and seeding.
• Seeding into rocky ground requires very durable machinery.
• The Cross Slot single disc opener provides a mechanism to safely lift each opener up and over the rocks without damage, and immediately returns to seeding.
• Unlike hoe and shank drills, Cross Slot does not pull rocks out of the ground.
• After several seedings, it forces the rocks below the surface to leave a clean, workable surface.

Cross Slot openers are readily adapted to small machines

SMALL & MEDIUM FIELD DRILLS

CROSS SLOT SPECIAL APPLICATIONS

UNEVEN CAPABILITIES

SMALL AND MEDIUM DRILLS
• The capability to seed into wide ranging residue and soil conditions offers ready opportunities without pre-treatments.
• Custom designed Cross Slot drills in widths of 8–25 ft (2.5–7.5 m) for smaller acreages are available with either fixed or folding frames.
• Small drills contain the same openers and control units as full size drills, adapted to appropriate seed and fertilizer tanks and meters.
• These range from small to larger versions of drills suitable for all scales of agriculture.

RESEARCH DRILLS
• Researchers have found the reliable and uniform seeding of Cross Slot openers very useful to their multiple plot experiments.
• Cross Slot openers readily adapt to variable residue, soil and seed depths for specific experimental trials, such as crop and variety testing, fertilizer rates, etc.
• Small field owners have adapted smaller versions of drills to accommodate their acreage and gate sizes.
Toolbars for large Cross Slot drills can be designed to fit customer needs. Tanks, meters and monitors are fitted accordingly. The following briefly describes common components of an example machine.

## TOOLBAR/DRLIL

- **Operating width:** 30’–40’ (9–12 m)
- **Transport width:** 12’–21’ (3.5–6.5 m)
- **Row spacing:** 10”–30” (25–76 cm) is common; infinitely variable from 6” (15 cm).
- **Auto-down-force system** for opener depth control.
- **Hydraulic Memory Valve** and hydraulic accumulators.
- **Hydraulic drawer tilt.** Flotation tires.
- **Seed hopper** 3–5 section meter.
- **Fertilizer hopper** 3–5 section meter.
- **Pneumatic seed distribution system.** Pneumatic fertilizer distribution system.
- **Hydraulic fan** and product delivery.
- **Camera system (2 or 4).**

## OPTIONS – COMMON

- **Product metering:** Hydraulic, electric or mechanical.
- **Fertilizer forms:** Dry, liquid, gas or combination.
- **Lights, walkways, safety options.**
- **Folding wings** with controllable wing pressure.
- **Delivery tube blockage sensors.**

## FIELD PROVEN TOOLS

Cross Slot openers have been thoroughly tested around the world for their capability and durability to successfully no-till seed many crop and soil options and challenges.

- **The seedings ranged from pasture/sod, cover crops to cereals and legumes in all ranges of soils from sands to clays, and all climatic ranges from droughts to floods.**
- **These applications were all with one opener style, Cross Slot, fitted to a multitude of custom frames and meters.**

## SPEED & HORSEPOWER

- Each Cross Slot unit requires approximately 6–10 HP per opener.
- **Additional 1–2HP** will be required, depending on the seed cart, fertilizer tanks or bins and topography.
- **Swinging widths of 6–8 mile/hr (9.5–12.5 km/hr) are common.**
- **A 45’ (13.5 m) Cross Slot drill** will seed a daily acreage equal to a 90’ (28 m) unit at 7 mph (11 km/hr).

## LARGE TOOLBAR COMPONENTS

### EXAMPLE STANDARD TOOLBARS

- **LARGE TOOLBAR COMPONENTS**
- **EXAMPLE STANDARD TOOLBARS**
- **FIELD PROVEN TOOLBARS**

## LARGE FIELD DRILLS & TOOLBARS

### CROSS SLOT OPENERS HAVE PROVEN THEIR RUGGED SUCCESS ON LARGE ACREAGES

### TOOLBAR/DRILL

**Standard openers.**

- **Operating width:** 30’–60’ (9–18 m).
- **Transport widths (wings up):** 12’–21’ (3.5–6.5 m).
- **Row spacing:** 10”–12” (25–30 cm) is common (infinitely variable from 6” (15 cm)).
- **Auto-down-force system** for opener depth control.
- **Hydraulic Memory Valve** and hydraulic accumulators.
- **Hydraulic drawer tilt.** Flotation tires.
- **Seed hopper** 3–5 section meter.
- **Fertilizer hopper** 3–5 section meter.
- **Pneumatic seed distribution system.** Pneumatic fertilizer distribution system.
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- **Camera system (2 or 4).**

### OPENERS – STANDARD

- **22” (55 cm) notched discs** (24” (60 cm) option).
- **3” (7.5 cm) or 4” (10 cm) ribbed press wheels.**
- **Triple-lipped sealed bearings.**
- **Screw depth adjustment.**
- **Individual hydraulic cylinder.**
- **Parallel linkage arms.**
- **Seed and banded fertilizer.**
- **Vertical travel 18” (46 cm).**

### OPTIONS – COMMON

- **Product metering:** Hydraulic, electric or mechanical.
- **Fertilizer forms:** Dry, liquid, gas or combination.
- **Lights, walkways, safety options.**
- **Folding wings** with controllable wing pressure.
- **Delivery tube blockage sensors.**

### FIELD PROVEN TOOLS

Cross Slot openers have been adapted to a wide range of drill and toolbar designs with options appropriate to customer needs.

- **Drills are commonly 18–36’ (5.5–11 m) wide with supply boxes and meters mounted on the frame.**
- **Toolbars are usually 40’ (12 m) to 60’ (18 m) wide with product tanks and meters on towed carts.**
- **Row spacings on both drills and toolbars can be adjusted to accommodate wide, for example:**
  - A 15’ (4.5 m) spaced single rank drill/plant can be set up to seed 30’ (7.5 m) corn or similar combinations.
  - A 10’ (3 m) spaced toolbar can readily be set up to seed 20” (50 cm) or 30” (75 cm) spaced crops.
  - One Cross Slot toolbar can be used to seed both cereals on 10” (25 cm) and corn on 30” (75 cm) spacing.

### 60’ (18 m) bi-folding toolbar, 12” (30 cm) spacing

### 45’ (13.5 m) folding toolbar, 10” (25 cm) spacing

### 40’ (12 m) toolbar, 10” (25 cm) spacing

### 30’ (9 m) toolbar, 10” (25 cm) spacing

### 25’ (7.5 m) toolbar, 10” (25 cm) spacing

### 24’ (7 m) folding drill, 10” (25 cm) spacing

### 35’ (10.5 m) folding single rank toolbar

### 30’ (9 m)折叠小犁耕，10” (25 cm)间距

### 24’ (7 m)折叠单行播种机

### 25’ (7.5 m)折叠小犁耕

### 20’ (6 m)折叠小犁耕

### 15’ (4.5 m)折叠小犁耕

### 10’ (3 m)折叠单行播种机

### 20’ (6 m)折叠单行播种机

### 15’ (4.5 m)折叠单行播种机

### 10’ (3 m)折叠单行播种机

### 5’ (1.5 m)折叠单行播种机

### 3’ (0.9 m)折叠单行播种机

### 2’ (0.6 m)折叠单行播种机

### 1’ (0.3 m)折叠单行播种机
FURTHER READING

No-Tillage Seeding in Conservation Agriculture – 2nd edition
Authors: CJ Baker, KE Saxton, WR Ritchie, WCT Chamen, DC Reicosky, MFS Ribero, SE Justice and PR Hobbs
Published by: CAB International and Food And Agriculture Organisation of the United Nations (Rome, Italy) 2006
SBN-13: 978-1-84593-116-2 (CABI)

Successful No-Tillage in Crop and Pasture Establishment
Authors: Bill Ritchie, John Baker, Mark Hamilton-Mann
Produced by: Monsanto New Zealand Limited 2000
ISBN 0-473-06685-8

OTHER INFORMATION

You will find a comprehensive summary of the science behind Cross Slot together with photos, videos and user comments from around the world.

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CROSS SLOT NO-TILL TECHNOLOGY SELECTED AS BEST IN THE WORLD
Our company designs the world’s most sophisticated no-tillage system. Our factories build them, we market them and support our Cross Slot users in the field. The science and design that originated at Massey University, New Zealand, is embodied in all our Cross Slot machines and is internationally recognized.

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CROSS SLOT SYSTEMS DELIVER

CROSS SLOT – TAKES THE RISK OUT OF NO-TILLAGE SEEDING & INCREASES YIELDS

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