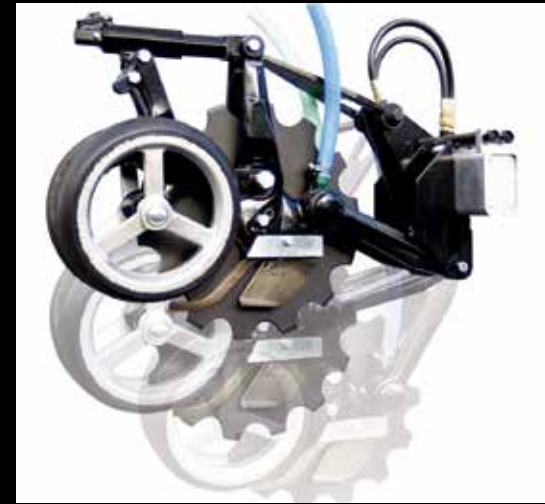


# Cross Slot<sup>®</sup>

**NO-TILLAGE SYSTEMS**



A KEY TOOL FOR REGENERATIVE AGRICULTURE

>>>> [www.CrossSlot.com](http://www.CrossSlot.com)



**CROSS SLOT  
NO-TILLAGE 2.0  
THE NEXT GENERATION**

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**FIELD BENEFITS OF CROSS SLOT SEEDING**  
*ONE-PASS LOW-DISTURBANCE CROP ESTABLISHMENT*

**CROPS AND ROTATIONS**

- ◆ Cross Slot drills seed all common agricultural crops and combinations.
- ◆ Yields—Extensive research and field experience has shown equal and improved yields compared with minimum and conventional tillage seeding.

**NO-TILL SOILS**

- ◆ Cross Slot drills seed precisely into almost all agricultural soils.
- ◆ Cross Slot drills readily adjust to variable moisture, density and friability.

**SEEDING DEPTH SENSOR**

- ◆ Each seeding opener down force is hydraulically controlled and independent of vertical travel.
- ◆ Required down-force for variable soil conditions is continuously monitored and automatically adjusted by an electronic sensor.

**BANDED FERTILIZERS WITH SEEDING**

- ◆ Fertilizer is banded adjacent to the seed through the same opener with no emergence reduction.
- ◆ All forms and combinations of fertilizer are possible: dry and liquid.

**RESIDUE MANAGEMENT**

- ◆ Heavy residue is no problem, either standing, chopped or lodged.
- ◆ No pre-seeding residue management is needed.
- ◆ Residue is returned over seed row with no 'tucking/hairpinning' problems in the seed slot.



*True low-disturbance no-tillage starts at harvest*



◆ "Cross Slot no-tillage is all about a total system – "software" as well as "hardware".

**ECONOMIC BENEFITS OF CROSS SLOT SEEDING**  
*COMPARED WITH TILLAGE AND MINIMUM-TILLAGE*

**DECREASED COSTS**

- ◆ Seed rate is reduced by high germination and emergence.
- ◆ Fuel costs, labour 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 disturbance, flotation tyres.
- ◆ Low-disturbance drilling reduces moisture loss – otherwise every tillage pass can lose 12 mm (0.5 in).
- ◆ Reduced irrigation frequency from conserved moisture.
- ◆ Stones/flints 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**

- ◆ Organic matter readily builds in first few years.
- ◆ Water infiltration – better porosity – less runoff.
- ◆ Biological variety and numbers improve.
- ◆ Soil trafficability – improved for machinery and livestock.

**INCREASED SEEDING EFFICIENCY**

- ◆ Routine seeding speed is 10–14 kmph.
- ◆ More hectares (acres) farmed with the same resources – more profit.
- ◆ More time available for crop management and lifestyle choices.



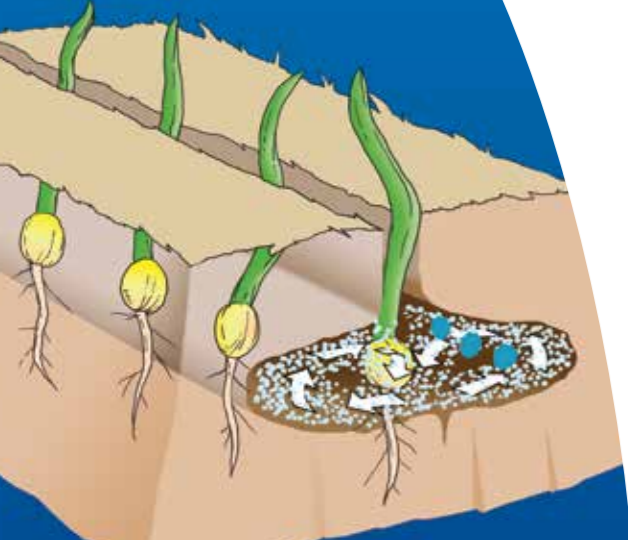
*Harvest*



*Drill*



*Crop Management*



Cross Slot: Seed, fertilizer, trapped moisture

Maize



## SEED & FERTILIZER PLACEMENT

### CROSS SLOT – A UNIQUE SEED SLOT

- Creates unique horizontal seed slots at precise, selected depths, whereas all other openers make vertical slots.
- Seed on one side, fertilizer placed simultaneously on opposite side.
- Residue folded back over the slots reduces moisture loss, provides seedling protection.
- Opener wheels maintain seed depth and firm closure.
- Self-closing of both slots ensures positive soil contact.
- Ultra-low soil disturbance conserves seed zone soil moisture.
- Positive closure of seed slot traps soil moisture vapor, ensuring rapid germination.



Cross Slot: separated fertilizer placement



Cross Slot opener



6m "full spec" Cross Slot drill



Lucerne

## FERTILIZER BANDING

### SIMULTANEOUS WITH SEEDING

- Fertilizer banded with the same disc opener that sows the seeds (true one-pass).
- Dry, liquid, or combination fertilizer banded simultaneously with seeding.
- Fertilizer banded at seed depth or deeper.
- Separated from seed 1.5–5 cm (0.5–2 in).
- Fertilizer banding is unaffected by soil moisture, form, residues or speed.
- Soil disturbance minimal and confined to sub-surface (non-inversion).
- True, one pass, low-disturbance, no tillage seeding.



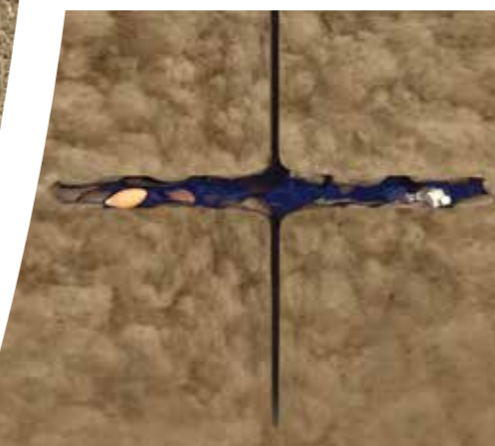
Fertilizer placed

Fertilizer broadcast



Fertilizer placed

Fertilizer broadcast



Seed & fertilizer placement...



...in one-pass



...diagonally offset if required



Each opener is hydraulically controlled

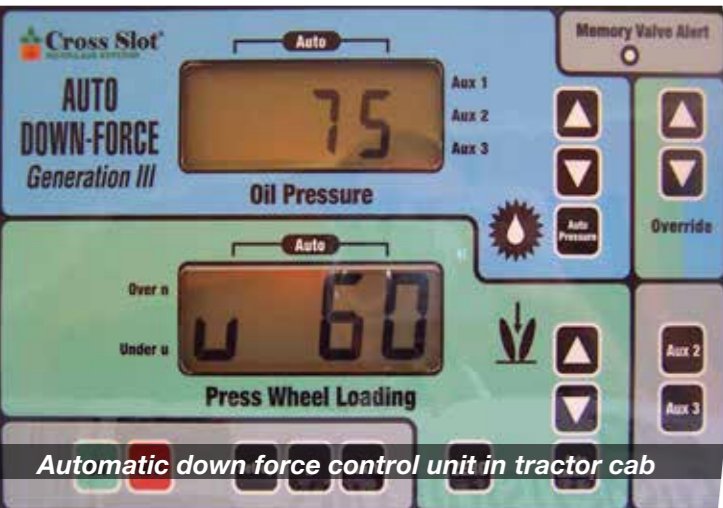
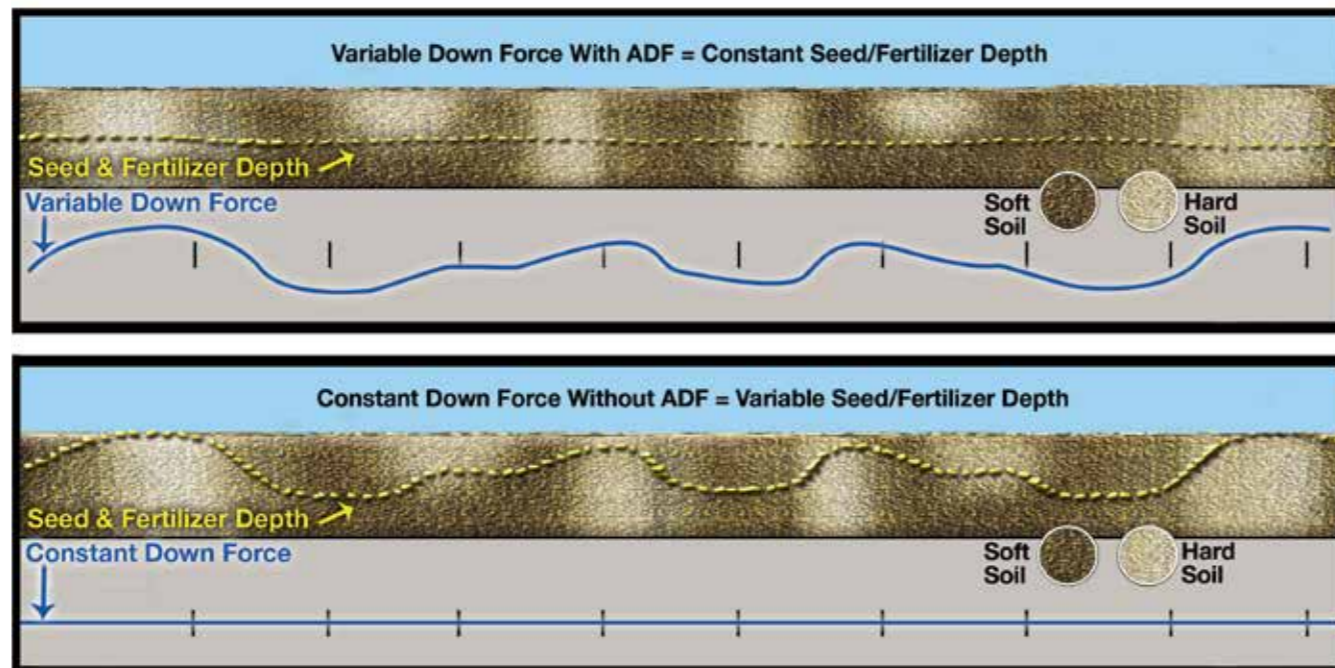


## SEEDING DEPTH CONTROL

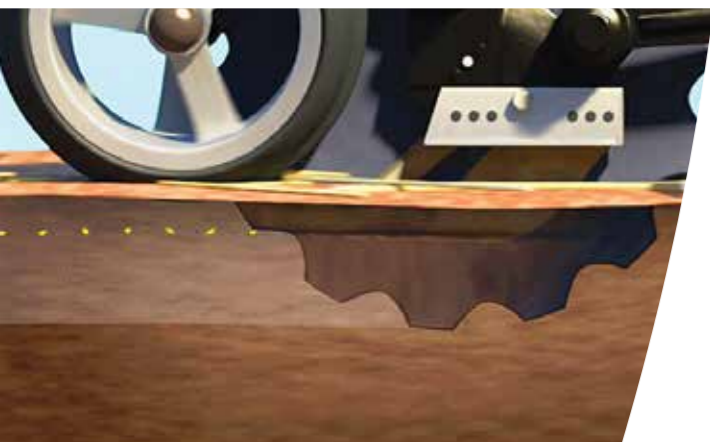
### A VERY IMPORTANT PERFORMANCE REQUIREMENT

- ◆ 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 500 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.
- ◆ The result is very even seeding depth and crop emergence.

### Depth Control by Automatic Down Force (ADF)



Automatic down force control unit in tractor cab



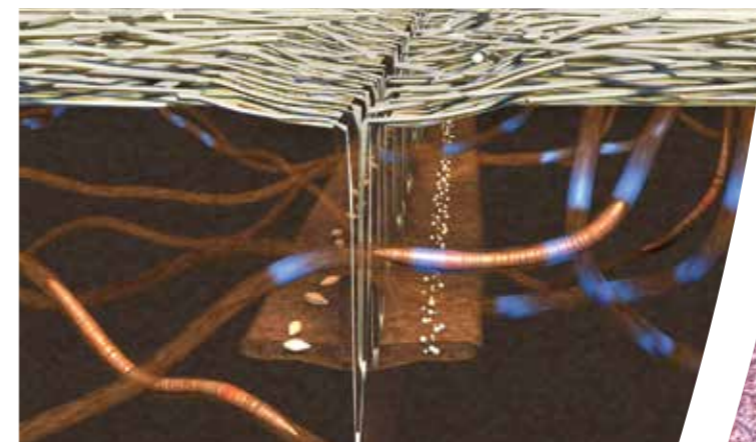
Each opener individually controls seed depth



Drilling wheat into clover cover crop



Drilling linseed into rye cover crop



Residues attract earthworms to the seed zone



## RESIDUE MANAGEMENT

### CROSS SLOT SEEDS IT ALL

- ◆ 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' – seed is placed to one side of the vertical slot.
- ◆ Existing field residues are retained without redistribution.
- ◆ Residue reduces rainfall impact and runoff (erosion), reduces evaporation (more soil water) and provides organic matter (soil carbon).
- ◆ Residues attract earthworms to the slot zone and provide food for micro-organisms.
- ◆ Grain crops produce several tonnes of residue per hectare worth £ £ £ £ £ in nutrients, moisture and yield gains.
- ◆ Don't waste it – use Cross Slot!



Seeding peas into heavy grass residue



Peas emerging through heavy residue



Extensive early root growth & earthworm activity



Excellent crop stand



Uniform crop emergence



## SECOND GENERATION NO-TILLAGE...

### IS A SYSTEM WITH

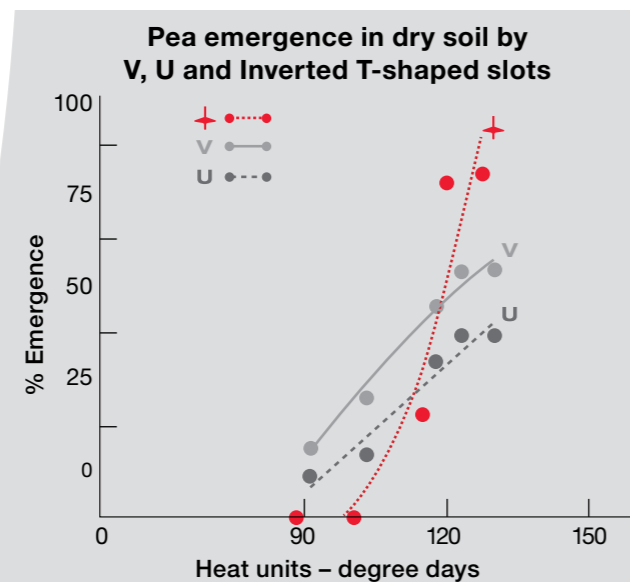
- ◆ More diverse crop rotations.
- ◆ Greater use of cover crops.
- ◆ Greater bio-diversity.
- ◆ Greater emphasis on soil micro- and macro-organisms.
- ◆ Greater utilisation/retention of surface residues.
- ◆ Different emphasis on creating the "right" seed environment.
- ◆ Greater emphasis on the seed micro-environment versus the field macro-environment.
- ◆ Greater emphasis on decreased soil disturbance.



Pea root extension in heavy soil



Good soil structure for plant growth



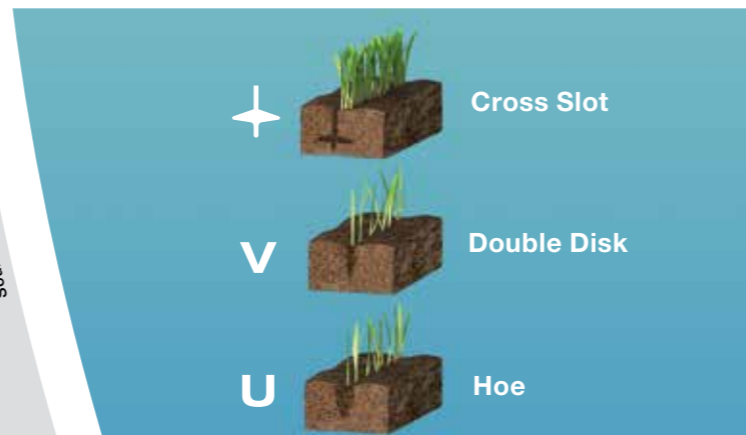
Emergence comparison graph



Cross Slot seeded winter wheat root growth



Conditions can be tough at seeding and emergence



Seedling emergence comparison in the dry



Drilling into sprayed cover crop



Emergence



Resulting crop



## CROSS SLOT IS A VALUABLE TOOL

### FOR PROVIDING FLEXIBILITY & RELIABILITY IN ALL DRILLING SITUATIONS

- ◆ Cross Slot demonstrates its flexibility and ability to seed directly into heavy residue.
- ◆ Spraying is the only preparation required before seeding.
- ◆ The principles of cover cropping and low-disturbance no-tillage seeding apply globally.
- ◆ The photos show the same concept in operation in North Dakota, USA (left) and Kent, England (right).
- ◆ Cross Slot owners share knowledge and experience through many mediums including an annual conference tour and social media.



Spray cover crop

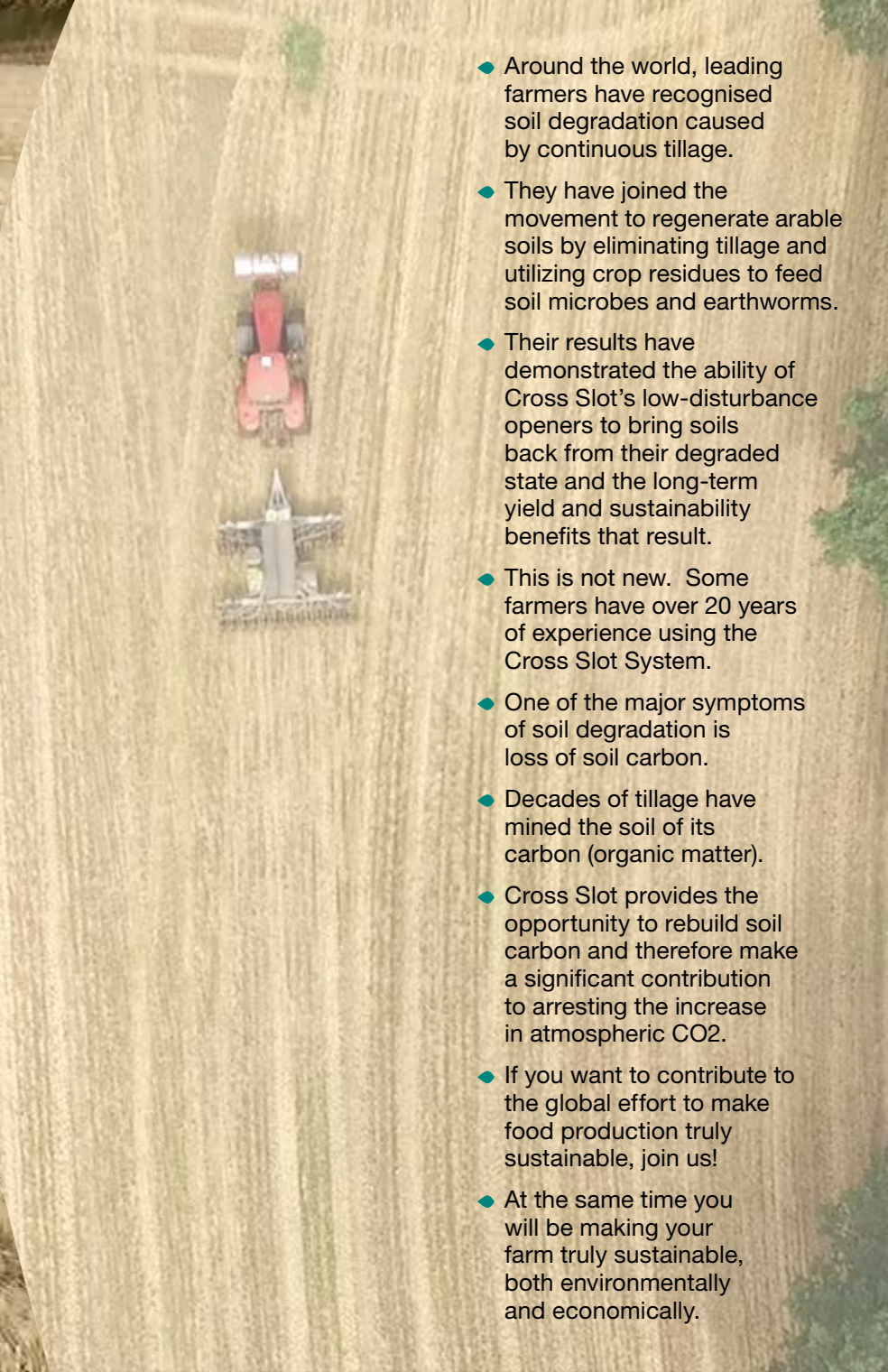


Drill



Emergence

# MAKE FOOD PRODUCTION TRULY SUSTAINABLE



- ◆ Around the world, leading farmers have recognised soil degradation caused by continuous tillage.
- ◆ They have joined the movement to regenerate arable soils by eliminating tillage and utilizing crop residues to feed soil microbes and earthworms.
- ◆ Their results have demonstrated the ability of Cross Slot's low-disturbance openers to bring soils back from their degraded state and the long-term yield and sustainability benefits that result.
- ◆ This is not new. Some farmers have over 20 years of experience using the Cross Slot System.
- ◆ One of the major symptoms of soil degradation is loss of soil carbon.
- ◆ Decades of tillage have mined the soil of its carbon (organic matter).
- ◆ Cross Slot provides the opportunity to rebuild soil carbon and therefore make a significant contribution to arresting the increase in atmospheric CO<sub>2</sub>.
- ◆ If you want to contribute to the global effort to make food production truly sustainable, join us!
- ◆ At the same time you will be making your farm truly sustainable, both environmentally and economically.



## CROSS SLOT APPLICATIONS

### UNIQUE CAPABILITIES

#### COMBINABLE CROPS, COVER CROPS, FORAGE CROPS, PASTURE

##### COMBINABLE CROPS

- ◆ Cross Slot has seeded most combinable crops in a range of conditions world-wide.
- ◆ The consistent seed environment results in even germination and emergence.
- ◆ Separate fertilizer placement (liquid or dry) enhances early establishment and plant growth to compensate for the lack of early mineralisation that results from soil disturbance.
- ◆ Superior soil strength resulting from improved soil structure results in less vehicle damage at harvest.

##### COVER CROPS

- ◆ 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.

##### FORAGE CROPS

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

##### PASTURE

- ◆ 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.
- ◆ Pasture can be sprayed and directly seeded with cover crops or combinable crops (peas are a good option).



Peas



Wheat



Cover crop



Maize



Peas



New pasture



Excellent contour following



Seeding uneven, muddy ground



Opener action – rise & fall 45cm (18")



## CROSS SLOT SPECIAL APPLICATIONS

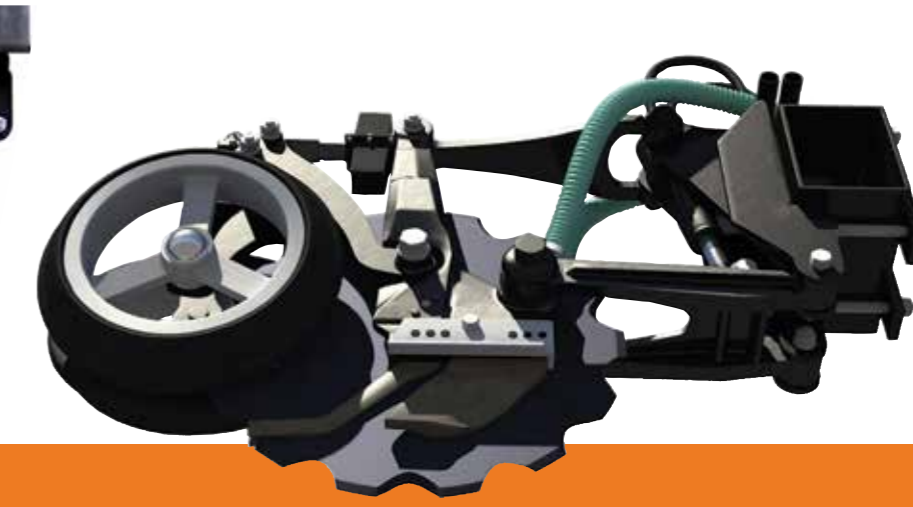
### UNIQUE CAPABILITIES

##### 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 45cm (18") 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.



Forage crop successfully seeded into rocky ground



Cover crop following wheat in flint ground



Close-up of above field after seeding



## CROSS SLOT SEED-ONLY DRILLS

PROVIDING AN ENTRY TO NO-TILLAGE 2.0

### FEATURES AND BENEFITS

#### CROSS SLOT MK IV OPENERS WITH

- ◆ 22" central scalloped disc.
- ◆ Tungsten-tiled side blade.
- ◆ 3" press wheels (plain or ribbed).
- ◆ On-the-move opener pressure control.
- ◆ Vertical opener travel 450mm.

#### PLUS

- ◆ UK built.
- ◆ Kverneland Accord seed metering.
- ◆ RDS seed rate control.
- ◆ Liquid fertilizer capable.
- ◆ 3, 4 and 5m seeding width.
- ◆ 2.6m transport width (folding models).
- ◆ Seed hopper size 2800 litres.
- ◆ 710 x 22.5 floatation tyres.
- ◆ Braked axle.
- ◆ Road lights.
- ◆ Rear and hopper cameras.

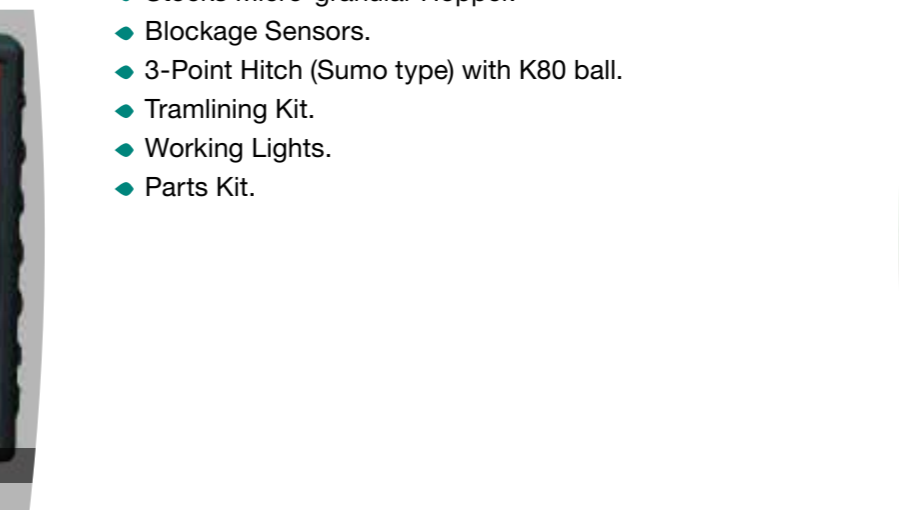


## CROSS SLOT SEED-ONLY DRILLS

PROVIDING AN ENTRY TO NO-TILLAGE 2.0

### OPTIONS

- ◆ ADF – Auto Down Force.
- ◆ Wide Row Kit.
- ◆ Blockage Sensors.
- ◆ 3-Point Hitch (Sumo type) with K80 ball.
- ◆ Liquid Fertiliser System (1000 litre front tank).
- ◆ Stocks Micro-granular Hopper.
- ◆ Blockage Sensors.
- ◆ 3-Point Hitch (Sumo type) with K80 ball.
- ◆ Tramlining Kit.
- ◆ Working Lights.
- ◆ Parts Kit.



5m seeding width

low disturbance

Auto down force control

Wide-row kit

excellent operator visibility

road lights

Blocked tube monitoring

Flints no problem

compact folding

CCTV cameras

rugged frame construction

Sumo hitch

Liquid fertiliser system

Micro-granular applicator





Containerised in pkd form



## CROSS SLOT 'FULL SPEC' DRILLS

THE COMPLETE NO-TILL SOLUTION

### FEATURES AND BENEFITS

#### CROSS SLOT MK IV OPENERS WITH

- ◆ 22" central scalloped disc.
- ◆ Tungsten-tiled side blade.
- ◆ 3" press wheels (plain or ribbed).
- ◆ On-the-move opener pressure control.
- ◆ Vertical opener travel 400mm.

#### PLUS

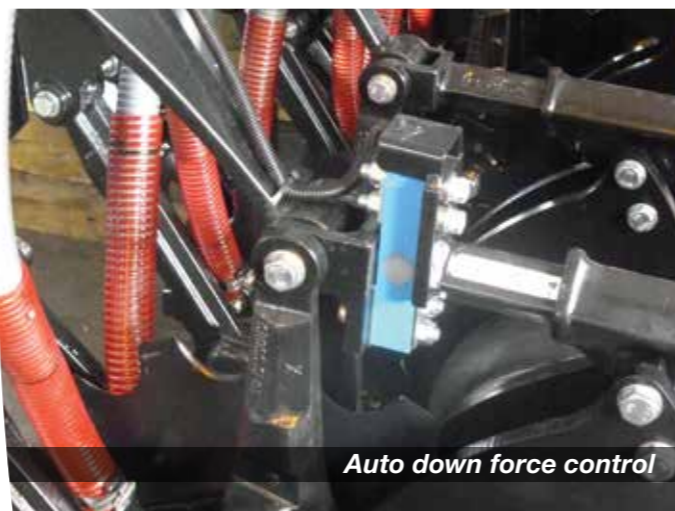
- ◆ New Zealand built with final assembly in UK.
- ◆ Containerised in partially-knocked-down (pkd) form for shipping.
- ◆ Re-assembled and commissioned by Primewest Limited (UK Product Specialists).
- ◆ Kverneland Accord seed and dry fertiliser metering.
- ◆ Kverneland Accord pneumatic product distribution.
- ◆ Topcon VR control.
- ◆ Liquid fertiliser capable
- ◆ 3, 4.5 and 6m models standard.
- ◆ 3m transport width (folding models).
- ◆ Custom models available.
- ◆ 800x26.5 floatation tyres.
- ◆ Hydraulic brakes.
- ◆ 1,250, 2,000 and 2,500L hopper options.
- ◆ Automatic-down-force (ADF) control.
- ◆ Hydraulic metering drive.



Floatation tyres



Heat exchanger



Auto down force control



Hopper shut-off slide



Topcon VR controller



3m Cross Slot



6m Folding Cross Slot



Hydraulic metering drive



Hopper weigh scales



## CROSS SLOT 'FULL SPEC' DRILLS

THE COMPLETE NO-TILL SOLUTION

### OPTIONS

- ◆ 150L granule hopper.
- ◆ Blockage sensing.
- ◆ Road and work lights.
- ◆ 2 or 4 camera CCTV.
- ◆ Multiple load cell ADF sensing.
- ◆ Heat exchanger to warm intake air.
- ◆ Hopper shut-off slides.
- ◆ Alternative controller through ISO connection.
- ◆ Hopper weigh scales.
- ◆ Hiab crane for bulk bags.
- ◆ And more....

### CROSS SLOT VARIANTS

- ◆ Toolbars.
- ◆ Plot drills for research/demonstration.
- ◆ Opener and electro-hydraulic kits.



Cross Slot toolbar (45')



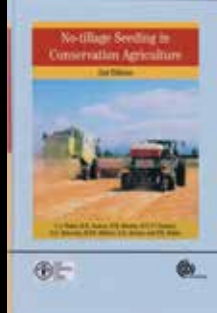
Cross Slot plot drill



Hiab crane for bulk bags



Cross Slot opener kit



**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

ISBN-10: 1-84593-116-5 (CABI), ISBN: 92-5-105389-8 (FAO), SBN-13: 978-1-84593-116-2 (CABI)

**FURTHER READING**

**Successful No-Tillage in Crop and Pasture Establishment**

Authors: Bill Ritchie, John Baker, Mark Hamilton-Manns

Produced by: Monsanto New Zealand Limited 2000

ISBN 0-473-06685-8



**OTHER INFORMATION**

Check us out on-line at [www.CrossSlot.com](http://www.CrossSlot.com). You will find a comprehensive summary of the science behind Cross Slot together with photos, videos and user comments from around the world.

There is also a spread sheet to help you determine the cost-benefit of Cross Slot on your farm (from "No-Tillage System" tab go to "Cost-benefit analysis").

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YouTube



**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 users in the field through our team of Cross Slot Product Specialists.

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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Email [info@CrossSlot.com](mailto:info@CrossSlot.com)

**SEE OUR WEBSITES**  
[www.primewest.co.uk](http://www.primewest.co.uk)  
[www.crossslot.com](http://www.crossslot.com)



Cross Slot openers have seeded into this residue – spot the rows...



MANUFACTURING AND DISTRIBUTING GLOBALLY

REGENERATIVE AGRICULTURE IN ACTION

