

garford

We Hoe, You Grow!

*The pioneer
in camera
guidance*



Precision Guided Hoes

Garford Farm Machinery

The hoeing specialist

Dear Friends of Garford,

My family have been farmers for many generations, and I am fascinated by the experience of making things happen and seeing the immediate results of my work.

Driven by the desire to improve things, we started manufacturing machines more than 35 years ago.

As you can imagine, we have seen a few setbacks along the way. At times we had to learn the hard way that each crop, soil and every single season require a different approach. Our machines stand out, because we never stop developing them, optimising every detail and adapting them to the diverse conditions we find in the field.

It's 25 years ago that we first developed, produced and started selling our camera guided hoe. Together with the Silsoe Research Institute we were true pioneers. Today, I am glad to see that more and more manufacturers are picking up the idea, and this drives **garford** to become even better. We do not aim to become the biggest manufacturer, but we do aim to make the best hoes. That's our claim. This is the commitment of our 70 colleagues and myself every single day.

We invite you to learn about us and our products on the following pages. And do let me know where we can become even better.

Very truly yours



Philip Garford



GOLD
Arable Innovation Award

Award for **babyleaf**

garford's innovational strength has been recognised by many prizes and awards. For example, in 2019 the new **babyleaf** hoe was awarded a gold medal at Lamma, the UK's leading farm machinery show. Controlled by a high-precision camera system, this hoe features specifically designed shares that work in row spacings as narrow as 5cm.



The Queen's Award (UK) for Enterprise and Innovation

The prestigious Queen's Award was presented to **garford** for the **inrow** weeder in 2010. This revolutionary product was the first of its kind that used imaging technology to remove weeds between the plants in a row.

The Queen's Award is the most coveted commercial prize in the United Kingdom and recognizes considerable achievement. The prize was presented to Philip and Janet Garford in the presence of Queen Elisabeth II at Buckingham Palace.

The programme

Hoes



interrow

Precision guided high-speed hoes for work between the rows.

6



inrow

Precision guided hoes for in-row work and between the plants.

28



babyleaf

Precision guided hoe for careful weeding in very narrow seed bands.

32



hoodspray · bandspray

Hooded and band sprayers for precision application of liquids.

34



spotspray

Targeted application of chemicals to solitary plants.

35



An Introduction to Garford Farm Machinery

Farmers, engineers and manufacturers who pioneered the camera guided precision hoe

Garford Farm Machinery was founded in 1986 by farmer Norman Garford and his three sons, Philip, Michael and Robert. The company first developed a trailed sugar beet harvester that was launched in 1988. In 1997 Garford Farm Machinery started developing a camera guidance system for hoes in collaboration with the renowned Silsoe Research Institute. This technology has consistently been evolving and refined ever since.

Lincolnshire is known for its fertile soil and is one of the country's bread and vegetable baskets. The Garford's worked on the family farm for many years before the development and manufacture of agricultural equipment became their passion and main occupation.

Today, more and more vegetable and row crop growers and arable farmers are looking for new solutions for reducing chemical inputs and less reliance on manual labour for weed control.

Taking a holistic approach, Philip Garford and his team explored the various systems that make up a machine, the mechanics, hydraulics, optical sensor electronics, and incorporated all these elements into one integral control system, which make the Garford hoes one of the most precise and acknowledged machines in the market. Garford Farm Machinery's philosophy is to continuously advance the technology and refine it down to the smallest detail.

Today, as a member of the Zürn Group, this philosophy has remained the same, with the Garford team continuing to strive for refined innovation into the future of agricultural hoeing.

Safeguarding profits

We support you with flexible solutions

garford offers optimum solutions that are tailored to your specific business – whether small or large, whether organic or conventional, whether looking for inter-row or inter-plant weeding.

Built to a modular design, our machines are customised very easily to your specific requirements and applications.

The individual tine frames are mounted in robust parallel links and feature laser-cut **diamond class** tool mountings that give you the flexibility to fit any type of share from the **garford** range and configure the machine to your individual needs.

By combining the **garford robocrop sideshift** system with market leading camera guidance, we have achieved new levels of efficiency and operator comfort. Further cornerstones of your productivity are the unmatched precision and reduced labour costs.

Camera guided hoeing has been our exclusive occupation for more than 20 years. **garfords** market leading competency has been reflected by patents and further refinements throughout the years. We develop hoes for minimal band widths that start at 5cm and work widths of up to 27m.



The advantages of mechanical weed control

A **garford** precision guided hoe offers multiple advantages for both the soil and the crop plants and helps us fulfil our responsibility for ecological farming.

A mechanical weeder not only removes the weeds, it also promotes root growth by improving soil ventilation. It breaks up crusted and puddled top soil, promotes the water retaining ability of the soil and microbial activity thereby mobilising nutrients and N minerals. Furthermore, it encourages tillering and plant growth.

In addition to this, hoeing reduces the input of chemicals by up to 100% for a more bee and insect friendly way of farming.

As agrochemicals are withdrawn from the market, more and more conventional farmers begin to appreciate hoes as more appropriate solutions. For example, hoes can effectively deal with resistant weeds.

Reducing crop work to a minimum, the market leading **garford** camera guidance technology maximizes operator comfort and ha/h performance.



robocrop interrow

The precision guided high-speed hoe

The original and best crop imaging system for precision guided hoes achieves excellent row following by viewing multiple crop rows over a large area.

- **robocrop** vision guidance system for high accuracy inter-row cultivation.
- **robocrop sideshift** for high speed up to 18kph with accuracy up to 1cm to the plant location.
- Parallel links with hydraulic **pressure down control** system dampers for accurate depth control.
- **diamond class** tine frames for easy fitting and adjustment of tines or shares.
- **lineraiser** ISOBUS section control.
- **robocrop contractor** multi-section machines available.
- Rigid or hydraulically folding frames and trailed machines for 1.5m - 24m work widths.
- Configurable to grain, sugar beet, vegetables and further row and special crops.

robocrop interrow

The modular design for maximum flexibility

All **garford** hoes are configured to a modular design. We customise your new hoe to your special needs, row spacings and work widths.

Our armoury of tools is well stocked and sorted. All components – the base frame, the parallel links and the shares – will be configured to your specific farming needs. This means you always get the results you require.

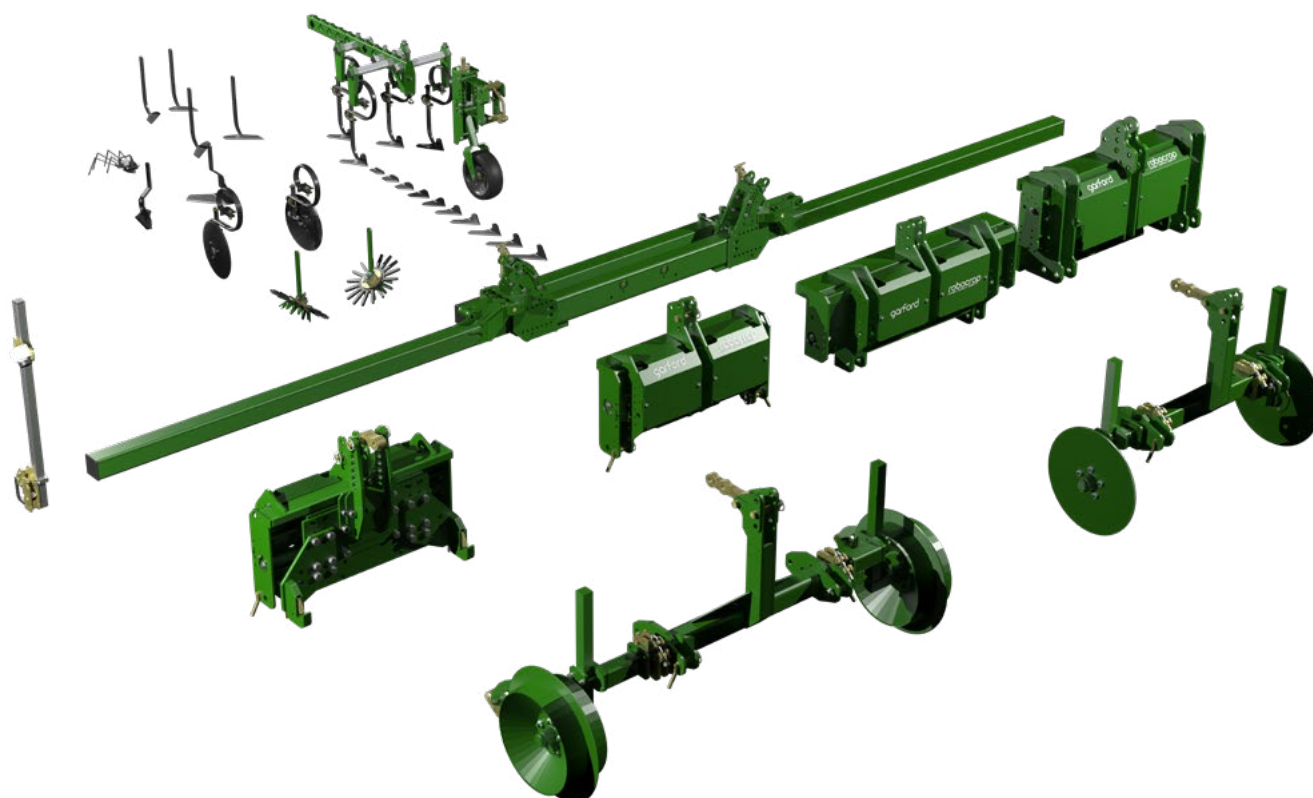
The modern precision hoe

By combining a side-shifting platform with an imaging camera, we can fit or retrofit this precision guidance technology to any traditional hoe and use it in all types of crops – grain, root and vegetables. The leading **garford robocrop** camera guidance system is more accurate and responsive than any other system. Equipped with lights for optimal illumination, our precision guided hoes deliver reliable accuracy day and night.

While ticking all boxes of a high-speed hoe, the robust design also gives you the flexibility of operating the hoe manually.

A comprehensive programme

garford offers a comprehensive range of arable and vegetable equipment. Along with the precision hoes that feature **robocrop** camera guidance, we also manufacture entry-level manual hoes that start at work widths of 1.5 metres as well as high-capacity models with hydraulic folding frames and trailed models for working widths of up to 27 metres.



robocrop camera guidance

The centrepiece of your precision guided hoe

The **garford robocrop** camera technology guides row crop equipment accurately and at high speed. A special video camera creates images of the crop foliage ahead of the machine which are processed by a computer. This information is utilised to guide the shares accurately along the crop rows by controlling the hydraulic **sideshift** platforms.



Faster

Thanks to the large field of vision and the multiple crop line processing feature, **robocrop** processes images of a very large area of approx. 1.5m², viewing several rows simultaneously and achieving precision guidance along the rows at work rates as high as 18km/h.



More accurate

The unique line and grid matching feature makes the **robocrop** camera guidance an even more accurate system for precision control down to the millimetre, even in gaps and heavily infested beds.



More versatile

robocrop is colour intelligent and offers a customisable colour scheme that allows you to go into any type of crop. The system is the optimum solution for work in green, red and other coloured crops.



More user friendly

User-friendly default settings make it easy for you to control the machine from the **robocrop** ^{4 QUICK TOUCH} terminal. Live tracking images help you monitor the work at hand.

A class of its own - High-Speed in cereals!

The special **garford** camera even views individual grain rows, with spacings starting at 12.5cm, guiding the hoe through the field at speeds as high as 18km/h.

In cereals, **garford robocrop** is definitely in a class of its own!

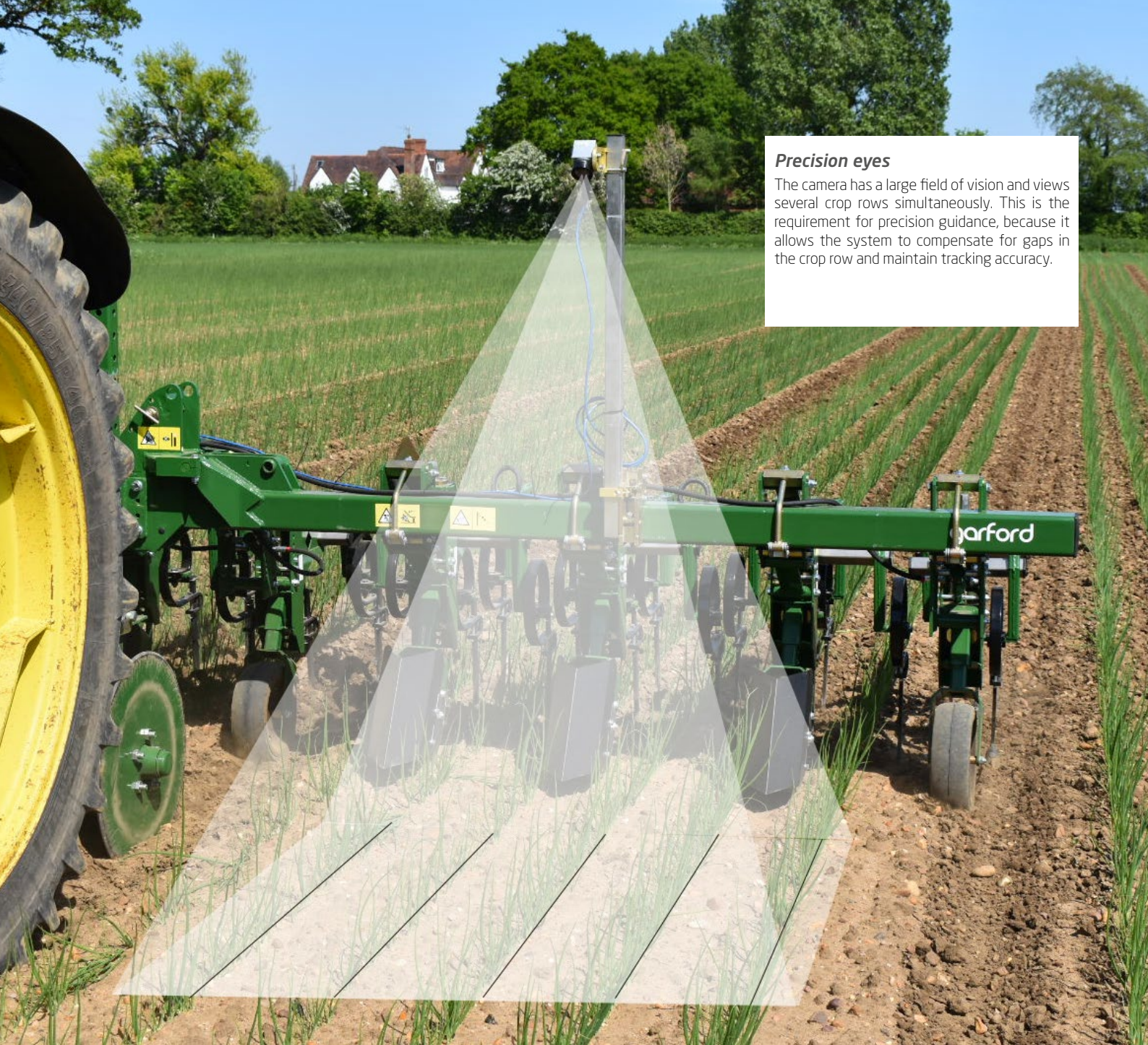


Thanks to the high-precision line and grid matching feature, the **garford** camera guidance is even reliable in windy conditions, a unique feature in the market.

By the way,

the camera system on our babyleaf hoe delivers reliable results in band widths as narrow as 5cm.

Compared to this level of accuracy, 12cm row spacings in grain are no challenge for it at all!



Precision eyes

The camera has a large field of vision and views several crop rows simultaneously. This is the requirement for precision guidance, because it allows the system to compensate for gaps in the crop row and maintain tracking accuracy.

Accurate row tracking

The 'last hoeing pass' should be made as late as possible in the season for a clean stand, because weed growth is effectively suppressed by the ridging action of the tines and increased shading as rows are closed.

The **garford** system works reliably also in late maize or sugar beet crops when these are just about to close rows. The intelligent system is not troubled by the generous foliage and guides the hoe with precision and at high speed through the rows.



robocrop camera guidance

Precision guided high-speed hoes

garford pioneered the technology of the camera-guided Side Shift System 20 years ago and has continued developing and advancing it ever since.

Today, robocrop stands unrivalled in the market of high-speed precision weeders.

Pioneer work

In collaboration with the renowned Silsoe Research Institute garford developed the revolutionary camera guided Side Shift System that was introduced as early as in 2001.

This camera-based technology opened a new dimension in mechanical weeding.

Instead of two operators covering only a few hectares per day, the new system allows one operator to carry out all hoeing with millimetre precision and yet at maximum forward speeds and throughout the entire day.



How does the garford camera tell crop plants from weeds?

Hoeing conditions are rarely ideal and this fact sorts the wheat from the chaff.

Honestly, could you tell which are the onion plants here?

Probably not, and this is even more difficult on a bouncing machine.

Unlike the human eye, the **garford robocrop** camera detects the crop rows reliably.

Yet what is secret of the recognized **garford** precision instrument and how does the system work?

This is explained in the following article on Line&Grid Matching.



How garford precision works

Line&Grid Matching

The camera produces image data that are processed by a computer. The higher concentrations of green pixels relating to the crop rows allow the system to locate the crop rows. Based on this information, the hoe is side-shifted by a hydraulic mechanism until guidance along the crop rows is accurate.

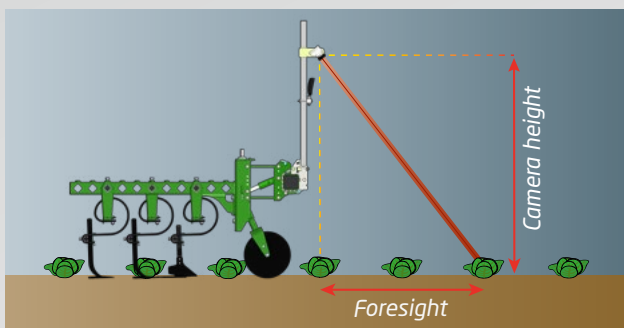
Yet how does the **garford** camera guidance achieve this level of precision?

Unlike other systems, the **garford** camera views a very large area and analyses several rows simultaneously,

this way achieving an excellent crop row centre line tracking. Also, the control signal is stable even in poor crop conditions.

This accuracy is further enhanced as the **robocrop** computer compares the images to a preset grid that reflects the row spacings.

It is this Line&Grid Matching feature which makes the system very tolerant against weed plants in the background of the image.



Line&Grid Matching

To use the Line&Grid Matching feature, simply enter the row spacing to the touchscreen terminal. Then adjust the camera to the required angle. After that, the camera will carry out any fine adjustments automatically. From now on the rows are detected accurately.



Live image of crop rows

The operator views the live image of the crop rows on the **robocrop** 4 QUICK TOUCH display screen. The image shows the default row crops (green lines) and the actual plants detected by the camera (blue crosses).

robocrop 4 QUICK TOUCH

Display screen with live image view

garford hoes are particularly user friendly showing real-time images of the crop rows, the robust **robocrop 4 QUICK TOUCH** display unit keeps you up to date on the system status. The software is regularly updated and expanded to meet future requirements.

Live image

The live image shows the current camera view and rows detected.

Multi Section

Here you switch between the individual live feeds from various cameras (if specified).

Image quality

Indicates the current quality of row tracking. This depends on environmental factors such as light, contrasts, etc.

Colour edit

Shows the colour range that is currently active for crop tracking.

Robust operator terminal

The operator terminal has a large 9" colour-display touch screen. The robust aluminium casing is protected against the ingress of dust and spraying water.

Work rate

When the maximum forward speed is reached the system issues an optical alarm that is followed by an audible alarm.

Manual Side Shift

You can operate the side-shifting platform manually if necessary. Enter the shifting range either to the terminal or execute the shift from a remote control (on hoes with operator seat, e.g. for blind hoeing).

Side Shift platform position

Shows the current position of the side-shifting platform and serves as steering assistance. A red arrow on the stop indicates the direction in which corrective manual steering is required.

Camera position

Side-shifts the camera relative to the default crop lines for more accurate guidance.



Camera configuration

Crop size, row number and spacing parameters are entered to the main menu. The operator enters the camera parameters (height, angle and heading) and selects the colour feature as required. The main menu also includes hectare and hour counters.



Slant correction

The feature shifts the zero position of the side-shifting platform off centre to the right or left to extend the shifting range and compensate for slope gradients. The direction of the slope can be altered after making the headland turn.



Colour intelligence

robocrop is colour intelligent and employs various colour modes (green, red, green/red, custom).

The custom colour feature (green, blue to red range) allows users to further optimise the system.



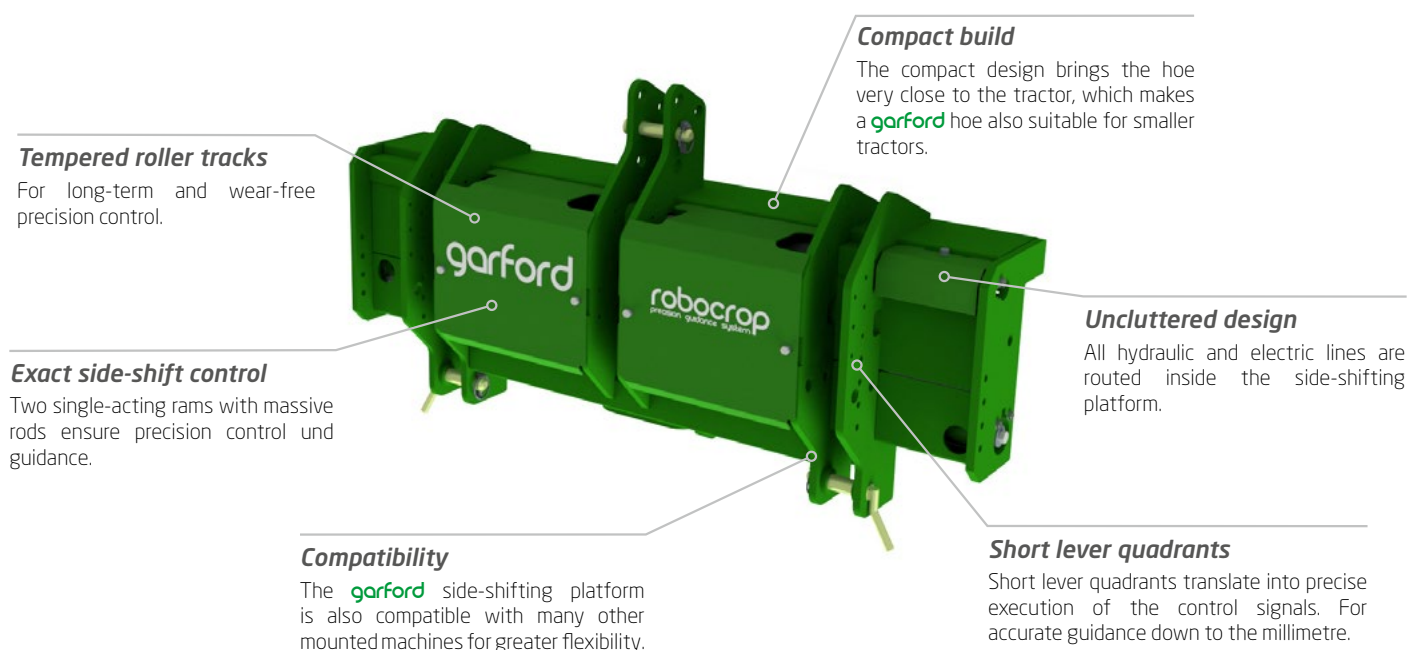
Your Garford advantage at one glance

**Maximum precision. Highest work rates.
Less operator stress.**

- The large field of vision of the **robocrop** system results in accurate tracking even in non-uniform emergence situations.
- **robocrop** works reliably in various crop rows, grains and vegetables.
- **robocrop** is colour intelligent and compensates for shading and bright sun light.
- **robocrop** is very accurate at high forward speeds.
- **robocrop** scans multiple rows and maintains high accuracy at all times even in heavy weed infestation, providing accurate guidance as long as the crop foliage is the dominant green (or other coloured) feature in the camera view.
- The side-shifting platform is of high-stability build for precision control throughout the entire operation.
- **robocrop** allows farmers to operate very large hoes in the rear tractor linkage and yet maintain a consistent accuracy and speed.
- Up to six cameras and several side-shifting platforms ensure accurate row crop work at large work widths.
- Smaller systems suit front linkage attachment for added versatility.

High-precision Side Shift System

garford side-shifting platforms are lightweight and very compact for close attachment to the tractor and use on small tractors. Ride stability and precision control are provided by two counteracting single-acting rams. The signals from the cameras are accurately translated into precise mechanical action and guidance of the **garford** side-shifting platform.



This is best platform for your precision hoe

The compact and hydraulic side-shifting platform is available in Standard, HeavyDuty or Extra-HeavyDuty specification and available up to 18m work widths.



sideshift SD30

Standard side-shifting platform for up to 4.5m work widths.

- 30cm shifting range.
- Approx. 177kg kerb weight.



sideshift HD50

HeavyDuty side-shifting platform for 9m work widths or 2,500kg kerb weight.

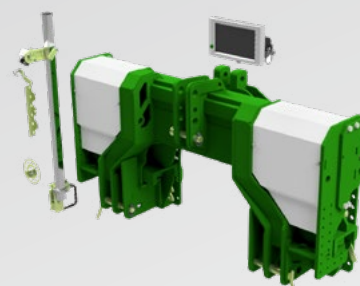
- 50cm shifting range.
- Approx. 344kg kerb weight.



sideshift XHD50

Extra-HeavyDuty side-shifting platform for up to 12m work widths or 4,200kg kerb weight.

- 50cm shifting range.
- Approx. 497kg kerb weight.



sideshift XHD50-PTO

Extra-HeavyDuty side-shifting platform with driveshaft lead-through for up to 12m work widths or 4,500kg machines.

- 50cm shifting range.
- Approx. 796kg kerb weight.



Reduced oil requirement

The hoe can also be operated on entry-level tractors that lack an electric spool, because the frugal **garford** side-shifting platform requires an oil flow as small as 10l/min.



Very close to the tractor

Although rugged by design, the **garford** hoes are relatively light-weight machines and the compact side-shifting platform brings the centre of gravity very close to the tractor for minimum compaction of your most valuable resource.

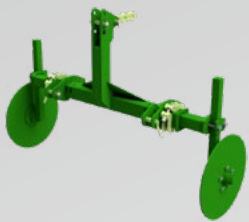


Precision work from the very first moment

The measure signal of forward movement is supplied by a GPS sensor instead of an odometer. This means the machine is lowered with greatest accuracy, so no plants are accidentally pulled out from the soil.

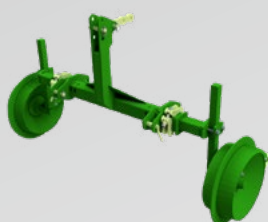
Stabiliser discs

Stabiliser discs transfer lateral drag into the ground to protect the tractor, ensuring the mounted hoe doesn't veer off track, which is particularly helpful on slopes.



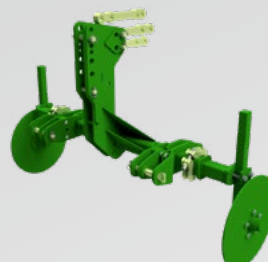
SD/HD stabilizer discs

- Stabiliser discs
- for **garford** SD30 and SD50 side-shifting platforms.



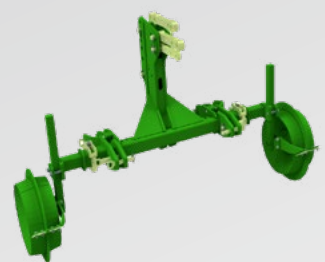
SD/HD flanged wheels

- Flanged wheels
- for **garford** SD30 and SD50 side-shifting platforms.



XHD stabilizer discs

- Stabiliser discs with higher-duty frame assembly
- for **garford** XHD50 and XHD50-PTO side-shifting platforms.



XHD flanged wheels

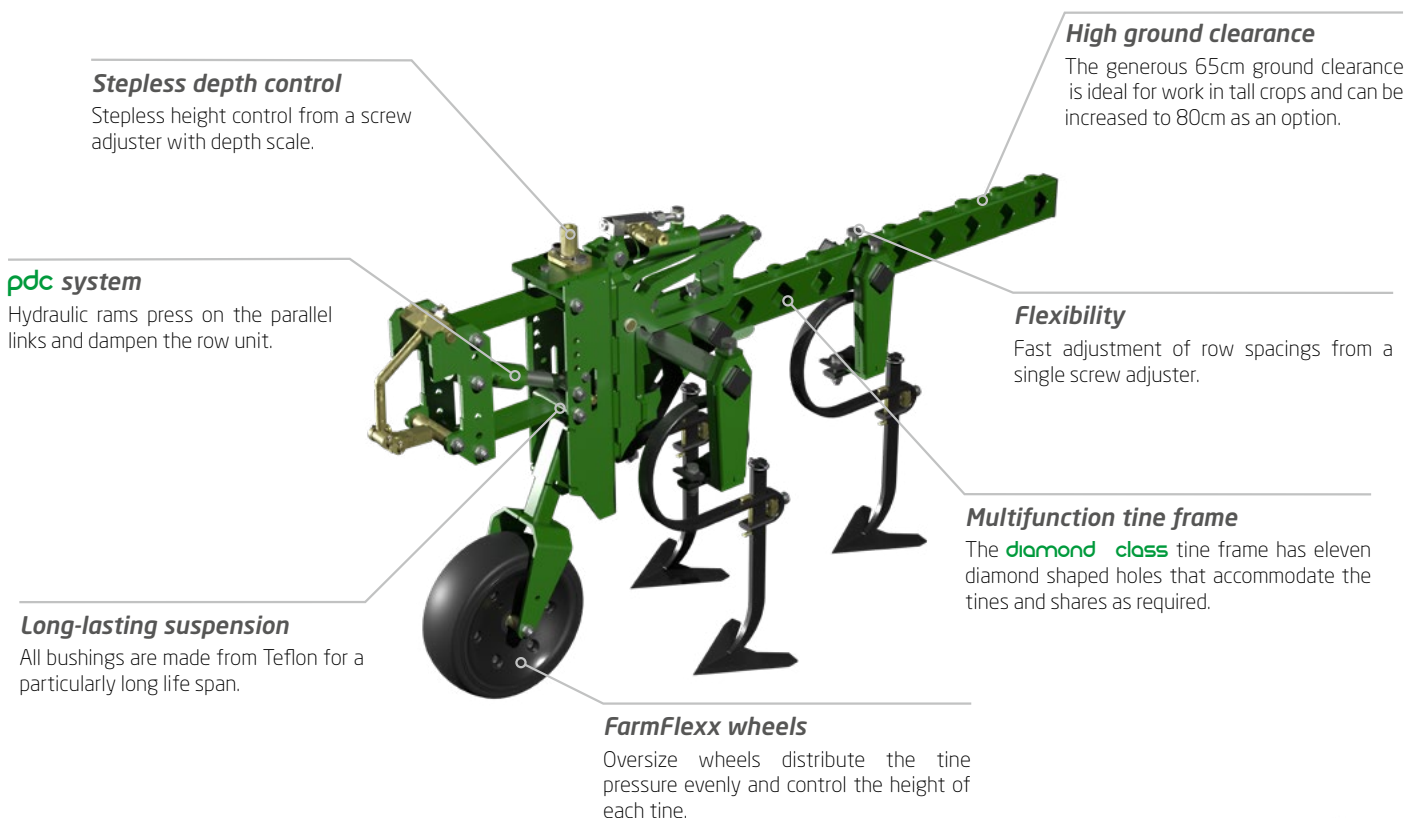
- Flanged wheels with higher-duty frame assembly
- for **garford** XHD50 and XHD50-PTO side-shifting platforms.

Parallel links with pdc system

Flexibility for your work

The distinctive of each **garford** precision hoe is the massive parallel linkage that was specifically designed for large-scale operations. Our unique **pdc** system dampens each row unit hydraulically and maintains absolute control of the shares and tines. Absolutely maintenance free Teflon bushings ensure long-lasting performance.

The modular design and tine frames with multi-function **diamond class** mountings for the tools make the hoe a very versatile machine that adapts flexibly to all kinds of conditions and applications. For best results even in the most challenging situations.



ISOBUS CONTROLLED SECTION CONTROL

Section Control for accurate headland work

The **lineraiser** headland management system is an option for precision work in awkward patches. The system raises one or several row units either manually or ISOBUS controlled.

The same applies to headlands, corners or pre-set no-cultivation areas where the individual **diamond class** tine frames are raised out of work using positioning data while the FarmFlexx wheels remain on the ground for good stability and uniform pressure on those tines that remain in work.

A second camera is recommended for optimal row tracking from both sides of the hoe. Section Control lifts up to 13 rows out of work. On wider machines the system raises the tine frames either in pairs or in triples.

The **lineraiser** increases productivity and maintains a constant quality of work.



Flexible use

The **diamond class** tine frames allow you to fit different types of tines to suit individual requirements.

The diamond shaped holes accommodate all tines of the **garford** product range. All are attached by a single bolt and are adjusted very quickly.

This design makes it very easy to swap tines or fit rotary finger weeders when changing from cereals to row crops, for example.

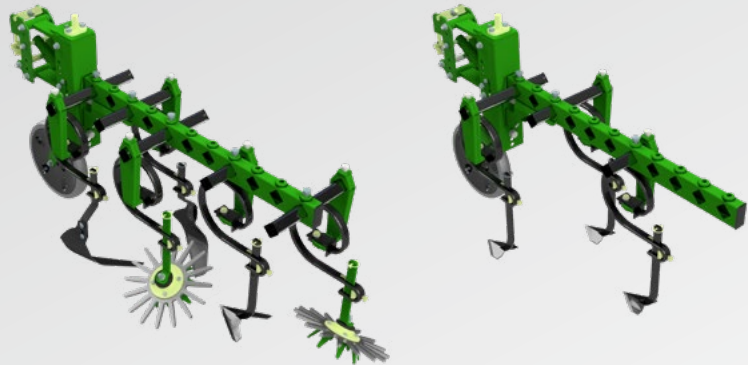
Also, it enables flexible spacing of the tools for blockage-free work.

Custom specification is a standard feature

When ordering your machine you decide which tines we'll fit to the **diamond class** tine frames.

For example, you can choose between L shares, A shares or rotary finger wheels for row crops (left) or duckfoot shares for cereals and minimum 12.5cm row spacings (right).

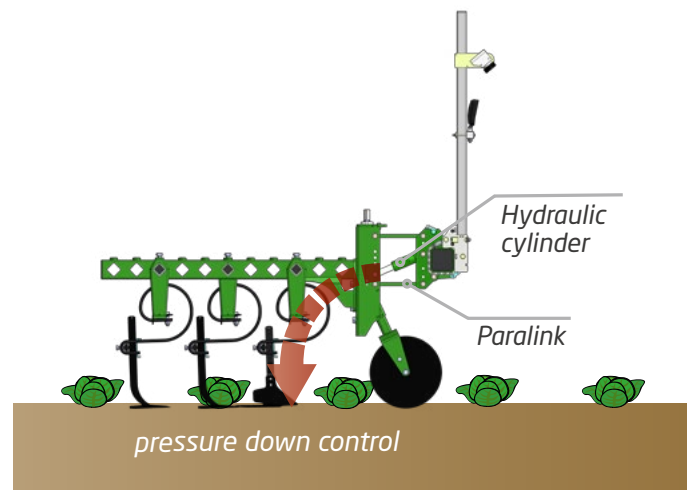
Swapping tools is quick and easy. Which tools are you going to use today?



Hydraulic dampers for the parallel links

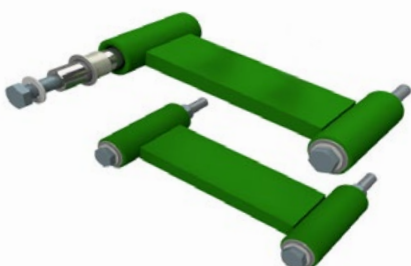
Our standard-fit **pdc** system (Pressure Down Control) is a unique Garford feature which has hydraulic rams exert a certain pressure on the parallel links, thereby distributing the machine weight evenly across the full working width and improving the quality of work especially in harsh soils.

At the same time, the rams dampen the row units, preventing bouncing of individual units. This way, PDC provides maximum stability in any type of soil and also at very high work rates.



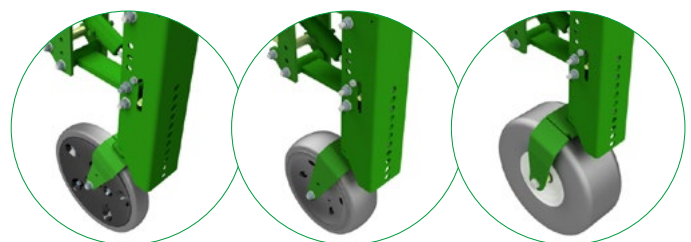
Paralink with Teflon bushings

All parallel links are absolutely maintenance-free. Teflon bushings and stainless steel inserts ensure great longevity and hard wearing.



Depth wheels

For work in traditional root crops, the parallel links mount on 10cm wide wheels. These standard-fit wheels can be replaced by 5cm FarmFlexx wheels for work in narrow crop rows, 16cm wide pneumatic wheels provide optimum depth control in light soils.



Hoeing tools

Configurable to your needs

All shares are made from high-tensile Hardox or Boron steel

Vibro blades

You can configure your **garford** hoe to your specific requirements and applications.

All shares have Vibro blades as standard. Mounted at right angles to spring-loaded S tines, the shares work gently around the roots and at a shallow depth. The Vibro effect works the weeds up to the surface for drying. As another positive effect, the Vibro blades shake off sticky weeds and penetrate the soil at an ideal angle ensuring accurate depth at any time.

L SHARES

The swept L share works very close to the row, protects the plant against being covered with soil and cuts effectively those weeds growing towards the neighbouring row. L shares offer stepless angle adjustment for shallow work or covering weeds with soil, for example.

A SHARES AND S TINE SHARES

For shallow and very uniform work with vibration effect. Both types of shares are available in various widths.

DUCKFOOT SHARE

This traditional share ridges the soil and covers the weeds. It is typically used in late row work in maize.

ROTARY FINGER HOE

By combining shares with rotary finger hoes, it is possible to work between the plants even in later growth stages. The boxy fingers work very close to the plant, removing small weeds or cover them with soil to cut them off from the light. In countless trials we found that they work best at angles of about 38°. The fingers, too, have maintenance free and specially sealed bushings for protection against ingress of dirt.

Side discs and crop protection shields are available for high forward speeds and yet effective protection of crop plants against getting covered with soil until the rows are closed.

SIDE DISCS

Side discs are available in straight or curved designs. Mounted on spring tines, the 280mm diameter discs cut into the soil on both sides of the plant. By making an initial cut, they support the work of the rotary finger hoes.

CROP PROTECTION SHIELDS

Mounted on parallel links, these 800mm long shields provide optimal protection to the neighbouring rows. They achieve best results when combined with the inter-row A and S tine shares.



YOUR SPECIAL GARFORD PLUS

We customize your hoe to your needs!

Many of our shares are available in various sizes to help you adapt your machine to the current growth stage.



A share with ridging coulter

Ridges moderately, breaks up the crust and cuts the weeds.



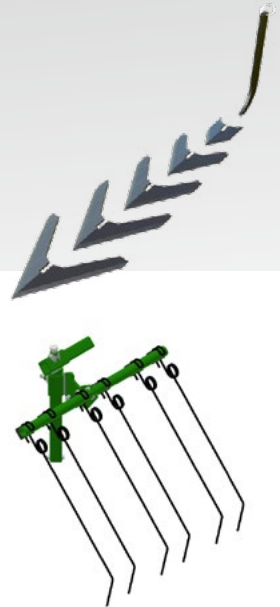
Leaf deflector

Protects crop leaves being cut by discs.



Spring weeder rake

Spring-loaded rake for attachment to a tine leg, made up of five 6mm tines. Variable width adjustment.



Weeder tines

Spring steel harrow tines for flexible attachment to the **diamond class** row unit.



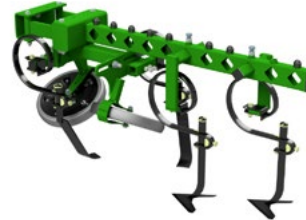
Ridging discs

For work in ridge tillage crops. Choose between one or two discs at 45° angles.



Ridging share

Protects plants being covered with soil; large size for effective work.



45° gauge wheels for bed farming

For ridge tillage bed farming. Pressure ram or spring controlled.



Vegi shares

Bed and ridge forming shares.



Deflector

Deflects massive clods and leaves ahead of the FarmFlexx wheels.



Track eradicators

Loosen the soil in the tractor wheelings.

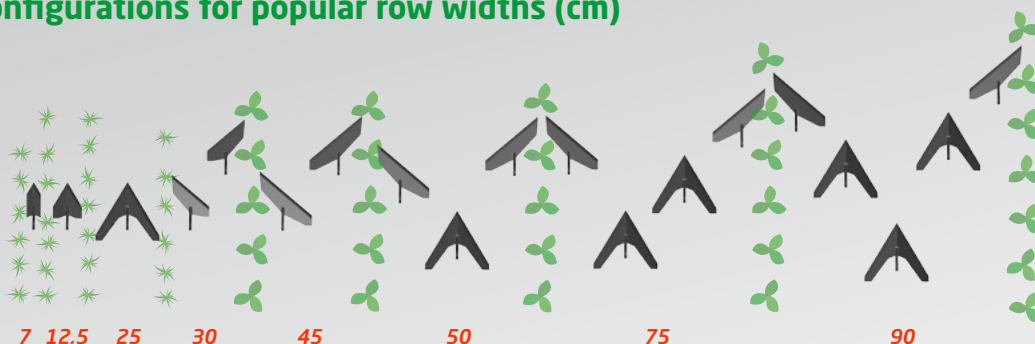


Fertilizer coulter

For targeted application of fertilizer granules and liquids.

Many more tools available for your crops!

Typical configurations for popular row widths (cm)



Flexible design

One base frame - multiple options

garford custom hoes accommodate all types of applications, work widths and farming schemes - from vegetable to large-scale arable. Built to a modular design, the base frame adapts perfectly to your individual requirements relating to row spacing, crop and operation.

You can choose among rigid, hydraulic folding and also semi-mounted versions and 1.5m to 24m work widths. No other manufacturer provides this broad range of options.

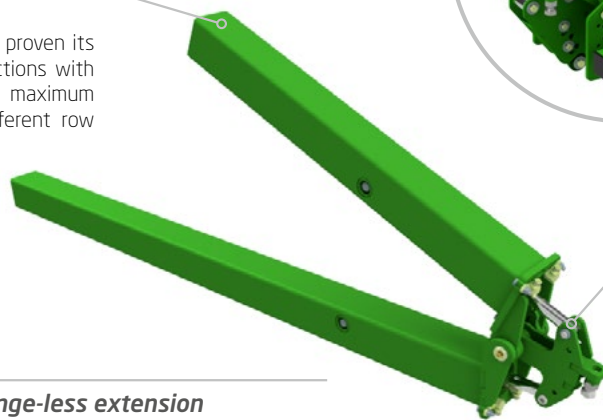
Torsion-free frame

Our torsion-free box section frame has proven its worth for so many years now. The sections with internal quick-clamp connections offer maximum flexibility and easy changeover to different row spacings.



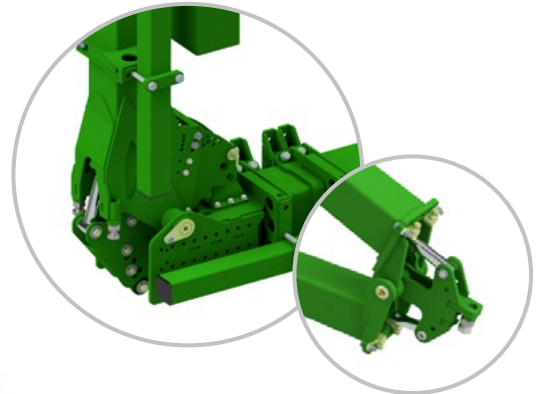
Flange-less extension

Thanks to the modular design of the frame assembly with internal clamp connectors you can easily extend the frame from 4.5m to 6m (6 x 75 to 8 x 75), for example. This is particularly intriguing for contractors who wish to use the hoe in different bed widths.



Internal rams

The rams that operate the folding mechanisms on the folding sections are integrated inside the beams for best protection, longevity and uncluttered layout.



Attachment options



Rear mounted

Most of today's hoes are designed as rear-mounted machines, because this configuration offers best precision control, highest acreages and maximum operator comfort. At the same time, it is least affected by the steering movements. This type of tractor attachment achieves work widths of up to 18m.

Camera guidance and manual control is available for specific applications. The same applies to band, hooded and spot spraying or fertilizer coulters.



Front mounted

A front mounted hoe offers best visibility of the work at hand and working widths of up to 9m. The massive and robust base frame with hydraulic folding frame accommodates all types of tools including the rotary finger weeders.

The pull-type configured parallel links ensure an optimum quality of work. Of course, the camera guided Side Shift System is also available on the front mounted versions for even better results and higher acreages.



Front / rear combination

You can operate the hoe as a front and rear combination to suit special conditions. In this setup, you can achieve work widths of up to 12m.



Frame variants



Rigid

Rigid frames; minimum 1.5m work width.



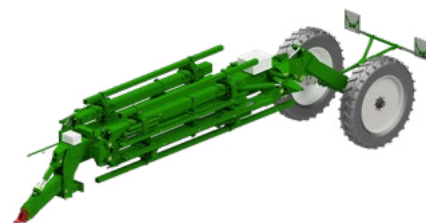
Single-fold

Two pivot points on up to 9m work widths.



Double-fold

Double-fold frames are available for work widths of up to 12m.



Semi-mounted

Rear-mounted machine with semi-mounted headstock for 12m - 27m work widths.

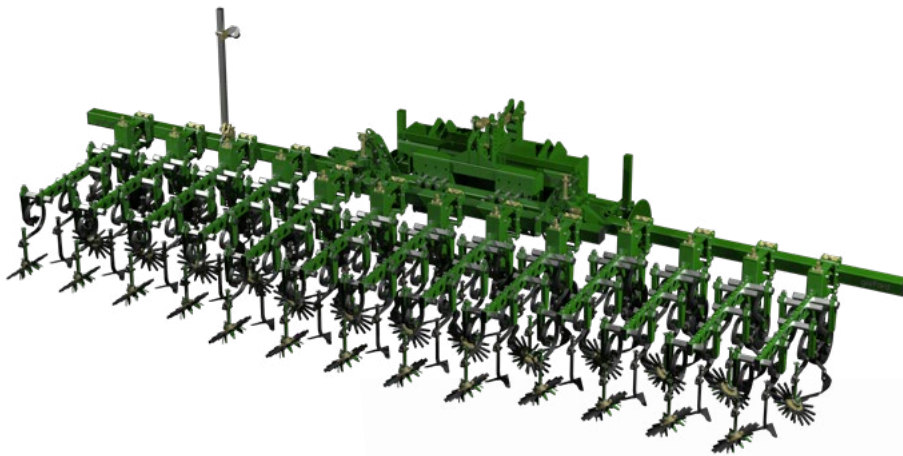
More accurate

You can install up to three cameras and opt for several side-shifting platforms to ensure accurate work at large work widths.



robocrop interrow

Example custom designs

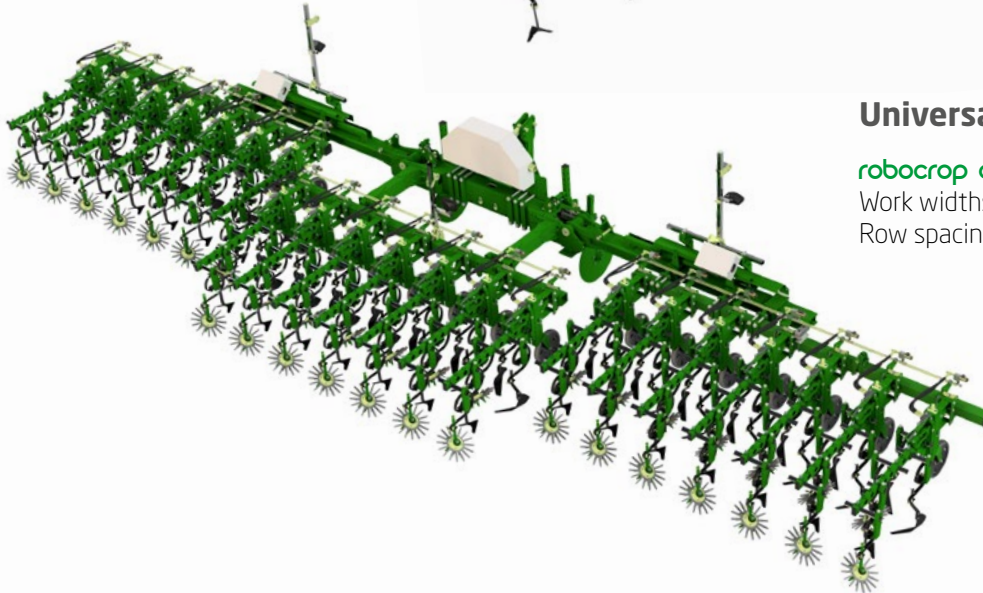
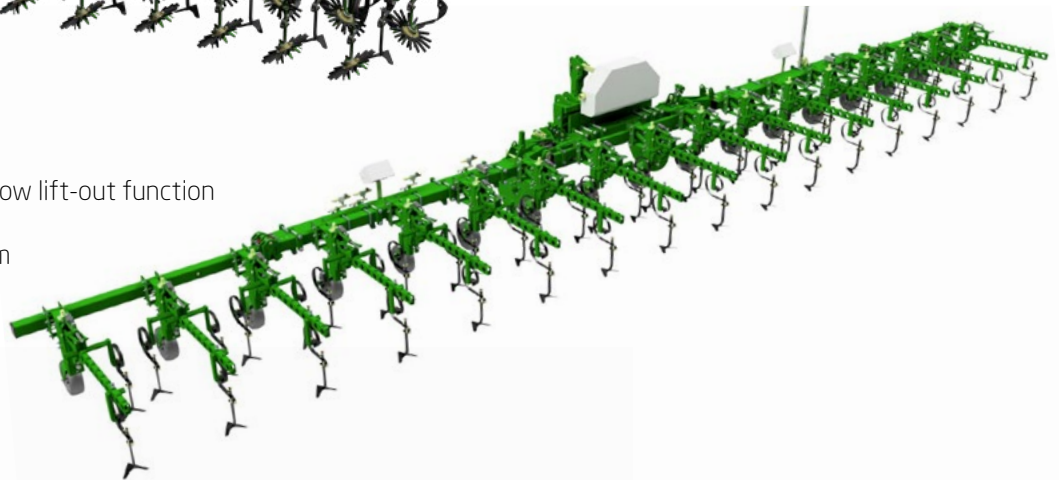


Maize, root crop and soy bean

Example work width: 6 m
Row spacings: 75, 50 or 45 cm

Hoe for cereals

With independent **lineraiser** row lift-out function
Example work width: 12 m
Row spacings: 12.5 cm - 30 cm



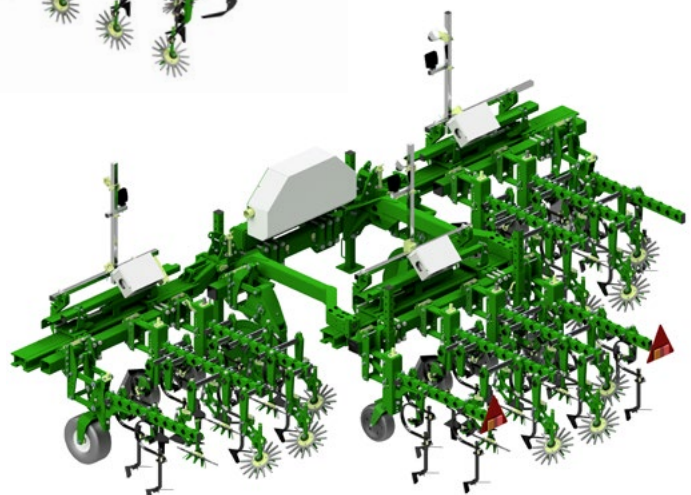
Universal hoe

robocrop contractor

Work widths: 9 - 18 m
Row spacings: 12.5 cm - 75 cm

Bed hoe

Flexible hoe for vegetable growers
Example work width: 3 x 1.5 m





Semi-mounted hoes for large-scale growers

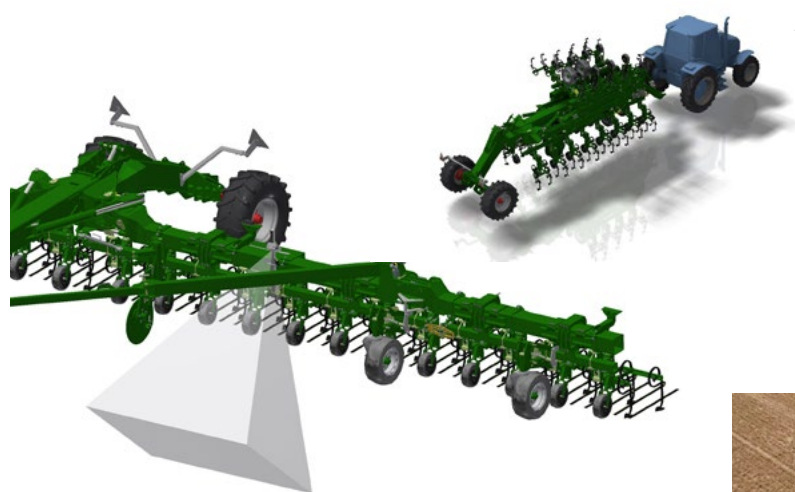
Precision work at up to 27 metres

Semi-mounted large-scale hoes combine mechanical weed control at greatest precision with maximum efficiency.

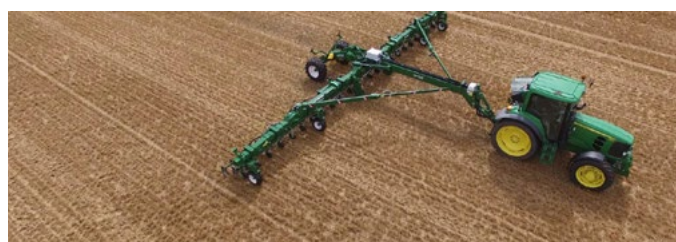
Two camera guided side-shifting platforms control the hoe with greatest precision even at the largest work widths.

The drawback of a large work width is a higher transport weight. Therefore, we made a point of optimizing the weight distribution between the tractor and the semi-mounted **garford** hoe, minimizing compaction at the same time.

The advantage of a trailed version over a mounted version is that trailed hoes offer larger work widths behind a relatively small tractor.



All semi-mounted **garford** hoes have a steered axle as standard for maximum manoeuvrability. Folding horizontally into transport position, even a 27m machine offers a compact and less than 3m transport width.



robocrop contractor

Twinshift and Triplesection hoes

Is drilling width equal to cultivating width? In principle yes - but thanks to the unique **robocrop contractor** design **garford** is able to override the principle in specific applications. The ingenious Twinshift and Triplesection technology enables users to efficiently cultivate grain stands that were sown with a traditional power harrow drill combination.

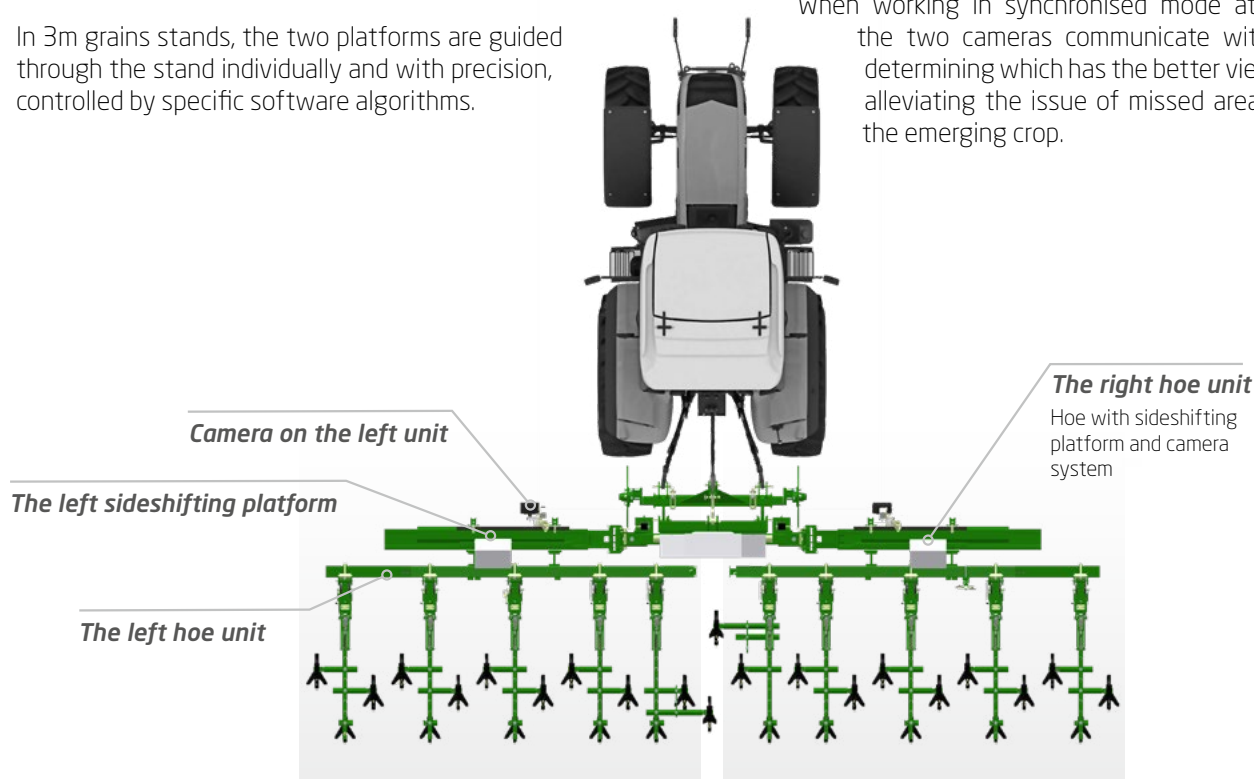
How the Twinshift system works

The system consists of two 3m hoeing units that mount on a foldable frame. Each of these units is controlled independently from one another. This technology relies on two separate cameras, one on each sideshifting platform.

In 3m grains stands, the two platforms are guided through the stand individually and with precision, controlled by specific software algorithms.

In 6m root crop stands by comparison, the two Twinshift platforms are synchronised with a touch of a button. In this case, both units operate as one single hoe.

When working in synchronised mode at a 6m width, the two cameras communicate with each other, determining which has the better view and thereby alleviating the issue of missed areas and gaps in the emerging crop.



Versatility 1

This grain stand was sown with a 3m drill. Here, the two camera systems work independently and the two hoe units cover two drilling widths in one operation.



Versatility 2

This maize stand was sown with a 6m drill. The two hoe units are synchronised to cultivate at this width in synch.



Maximum flexibility

garford contractor offers maximum flexibility in weed control operations, starting from 12.5cm row spacings in grain.



The universal weeder for contractors

For high work rates in contracting operations, the **robocrop contractor** now features Triplesection.

This adds a third sideshifting platform and camera control system to the machine, enabling it to adapt to different drills and row widths. The platform is coupled via the main frame to the tractor's three-point linkage.

In Triplesection specification, the machine can cultivate stands that were sown with a 3m drill, covering 9m in one pass. In stands drilled with a 6m drill, the two camera systems on the two sideshifting platforms work in synch and the third sideshifting platform is working at only half the drilling width, leaving the other half to be cultivated in the return pass – a smart solution that saves contractors the expense of multiple hoes.



The sideshifting technology

The sideshifting platforms are mounted on the foldable main frame which consists of specifically formed and tempered box sections that enable precision control.

Naturally, the **robocrop contractor** hoes can be specified with the **lineraiser** technology and the ISOBUS Section Control headland management.

Maximum efficiency for vegetable growers

The Twinshift and Triplesection principle is perfectly suited for weed control in vegetables and other special crops, cultivating three beds in one single pass, for example.

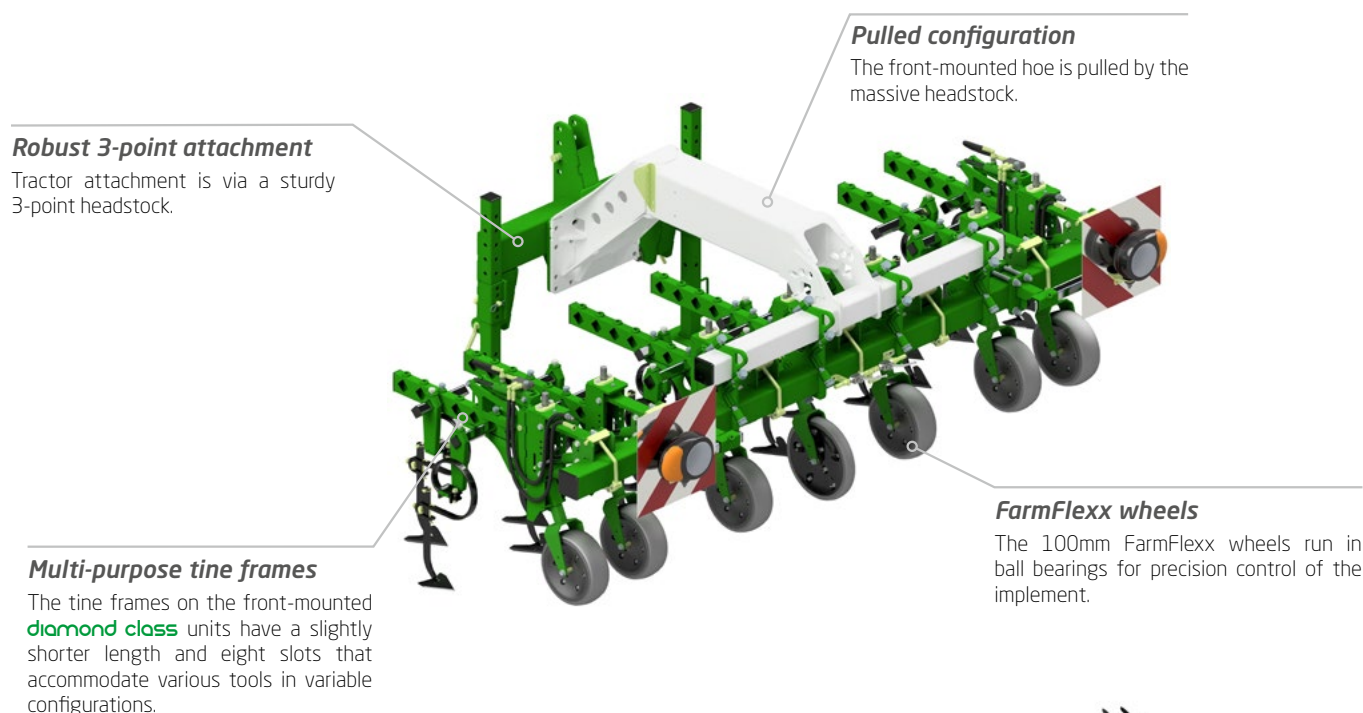


Front-mounted hoes

There is also a large choice of front-mounted hoes available from **garford**. The front-mounted **garford** weeders are attached to the tractor in a pull-type configuration for a clear overview and straightforward control - a major boon in undulating terrain and on steep slopes.

Thanks to their modular design, the **garford** front-mounted hoes can be configured to work at a wide range of widths - from 1.5m to 6m.

The unique **pdc** system is naturally also a standard specification on the front-mounted version as well. The tine frames accommodate up to eight tines or other tools such as rotary fingers or harrows.



The folding system

The implement is folded from the convenience of the tractor seat. In transport position, the wings are secured with pins at variable angles for optimum visibility and stability.

The hydraulic cylinders are arranged on the inside of the frame for maximum movement of the parallel links and for weeding at any traditional row spacing.





Overview

A front-mounted hoe offers an excellent view of the tools.



Versatility

A front-mounted hoe adapts very easily to different applications such as the first weeding pass in maize.



Top-level spec

All front-mounted hoes are available with the **tine raiser** function which raises the tine frames hydraulically or mechanically.

With or without camera

The **robocrop** camera control and Side Shift systems are also available for the front-mounted **garford** weeders and for all working widths.





robocrop inrow

Precision weeding between and in rows

The **robocrop inrow** weeder uses video image analysis techniques to locate individual plants in order to mechanically remove weeds from the inter row and importantly within the crop row between the plants.

- The market-leading video image analysis detects individual plants and instantly switches between green, red and infra-red colour modes.
- Flanged wheels are actively steered in the rows.
- Unique rotating share for total weed control (98% coverage).
- 8-10mm accuracy to the plant location.
- 15cm minimum plant spacing; minimum 20-25cm row widths.
- Option for hydraulic and electric drive rotors.
- Work rate: Up to 6 plants per second and row (equates to up to 5km/h).
- Option: Localised application of liquids to individual plants.
- Systems available from 2 rows up to 20 rows and beyond with eRotor.
- For lettuce, vegetables and row crops like sugar beet.

robocrop inrow

How it works

The camera captures the images of the plants ahead of the toolbar

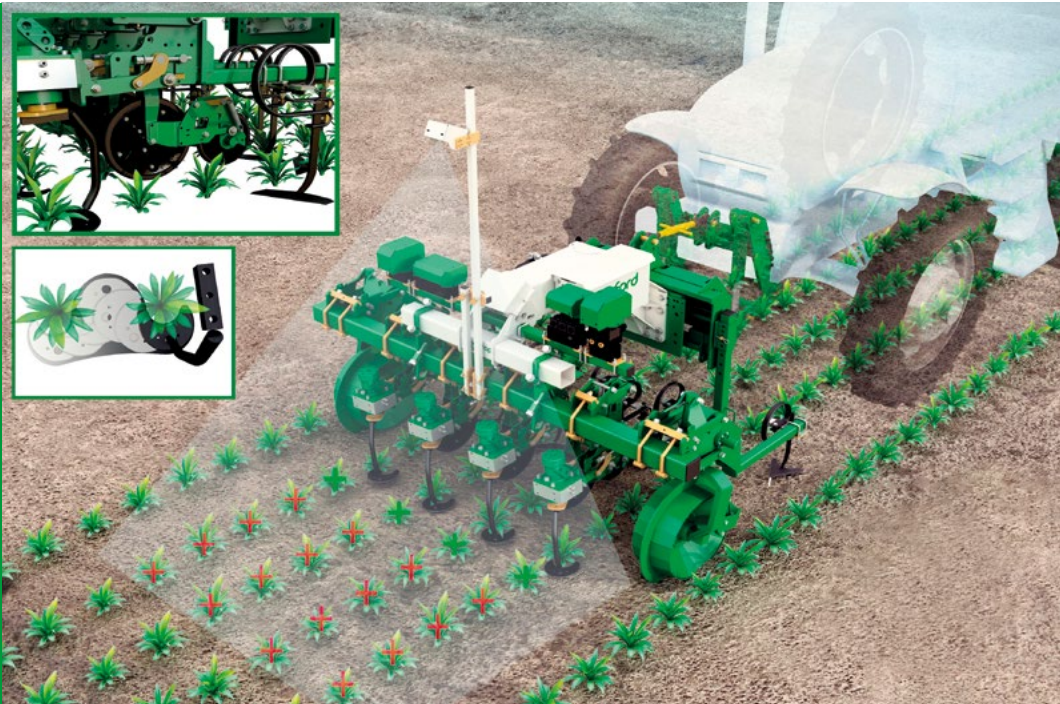
The computer analyses the camera feeds

The processor monitors the current rotor position and speed

The depth wheel supplies exact information on the current forward speed

The control unit alters the rotor speed via the hydraulic valve or electric motor

The weeding disc rotates around its axis, cutting with precision between the plants



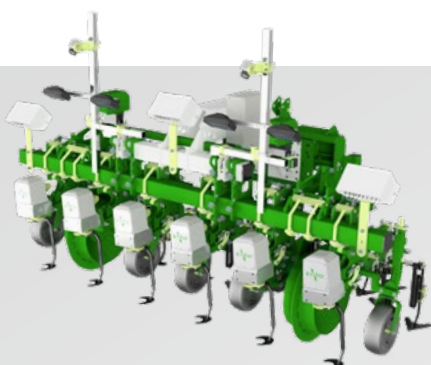
HOW THE ROTORS WORK

The unique **inrow** weeding system offers unmatched precision. Its specifically shaped discs work at a shallow 10-20mm as they rotate around their axes.

Their crescent profile arcs around the plant and cuts between the plants as it rotates around its axis, moving 98% of the soil that surrounds the crop plant.

At the same time, the hoe is being steered laterally by the flanged wheels that provide precision control of the shares working between the crop rows.

Each of the crescent shaped discs is driven by its own hydro motor which in turn is powered by a hydraulic proportional valve controlled by the **robocrop** computer.



eRotor

garford also offers eRotor solutions in addition to hydraulic rotors. The electric rotors are powered by a generator assembly which is mounted either on the hoe or on the tractor.

As the electric system speeds up the communication between the camera system and the motor, it enables higher work rates at maximum precision.

robocrop inrow

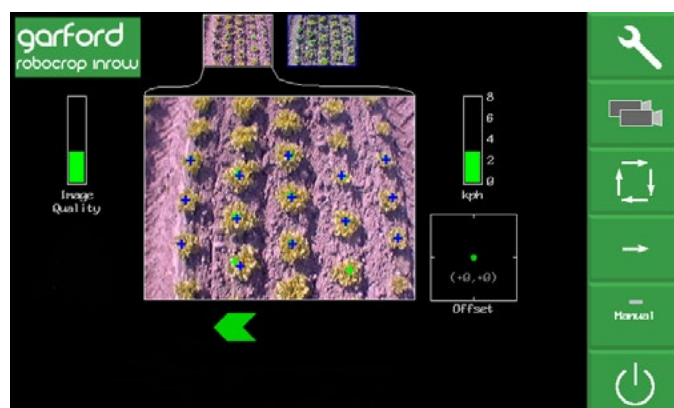
Unique imaging technology

The **inrow** precision control system relies on a unique image processing technology for guiding the rotating weeder elements. The technology analyses the feeds from a digital video camera to locate the individual crop plants as they move through the image.

This information is then utilized for lateral steering and synchronizing disc speeds with the image data of the plant positions, allowing the machine to adjust to different crop spacings and the current work rate.

For reliable operation the crop must be the more dominant feature in the image and present more foliage than the weed material. In these conditions it is possible to hoe around up to 6 plants per row and second.

Although **robocrop inrow** also achieves effective results in mixed vegetation, an optimum performance requires reasonably separate plants.



Camera system

The camera covers an area of up to 2m width. This translates into 5 rows of lettuce spaced at 35cm. Two cameras are required for 45cm or 50cm spaced sugar beet crops and 3m work widths. For covering even larger widths we can install 3 cameras which are operated from the **robocrop 4 QUICK TOUCH** terminal. The system is very user friendly and easily calibrated to the individual crop.

Attachment options



Front mounted

A front-mounted hoe can work at widths of up to 6 metres and is available with or without hydraulic folding. The number of rotors and cameras can be selected flexibly to suit individual row spacings. The cameras look ahead and scan the plants ahead of the toolbar.



Front-rear combination

By combining a rear hoe with a front hoe you can achieve work widths of up to 20 rows for large-scale cultivation. The advantage of this configuration is a balanced and even weight distribution to the tractor.



Rear mounted for bed crops

For the camera to have a clear view of the crop plants it is necessary to have a portal frame which allows you to match work width and rotor arrangement to your specific beds. Its pull-type action loosens the tractor wheelings and refreshes the bed line.



Tractor requirements

Tractor requirements
Four-wheel drive, Cat 2 front linkage approx. 80 hp for 4 rows (2 metres) · approx. 100 hp for 6 rows (3 metres) · approx. 150 hp for 12 rows (6 metres)
Oil flow
approx. 8 l/min per rotor + approx. 10 l/min for hydraulic autoguidance
Power supply
12V · In eRotor specification, the electric power is generated by an on-board generator

robocrop inrow

Unmatched productivity and reliability

Growing vegetables or organic sugar beet requires a lot of manual labour. The unique **inrow** technology nearly does completely away with manual hoeing in lettuce, cabbage, onions and herbs.

In organic sugar beet growing, the **garford** hoe can reduce manual work by up to 80% – an accurate seedbed preparation and seed placement provided.

The **inrow** technology has been successfully applied by many vegetable and arable farmers for more than 10 years. The practical, mature and long-lasting design is typically **garford** and easy to use and mostly maintenance free.

Made for non-stop work, the **inrow** system is extremely robust and reliable. Most machines are ordered with 4-6 rotors, but the modular design allows 20 rotors to be configured for up to 6m work widths. We can even build wider machines on request.

The key parameter for such a large-scale custom solution is viability, but maximum uptime is also very important for these seasonal machines.

Example calculation

based on a 20ha organic sugar beet field

Weeding gangs

150 hours of manual cultivation/ha
€10/h = €1,500/ha

Add to this costs for staff accommodation and further overheads.

Total costs for 20 hectares:
€30,000/year as a minimum

InRow hoe

Costs for 6-row machine approx. €120,000
8-year depreciation + interests:
Hoe = €16,000 per year

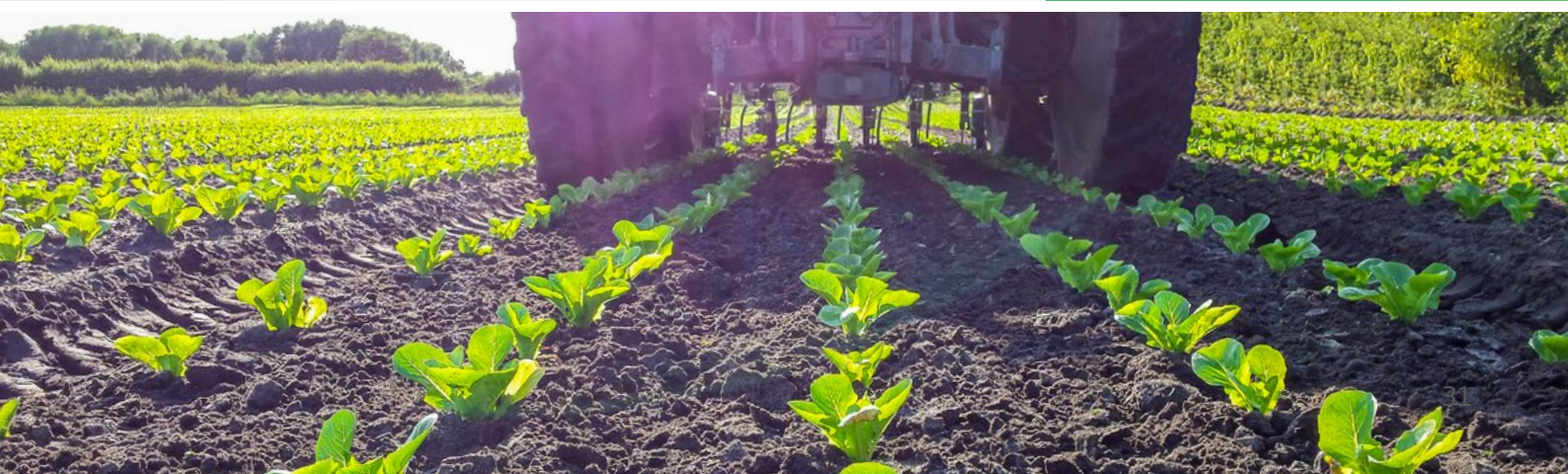
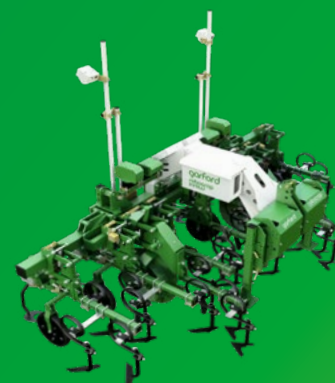
+ Manual hoe = €400/ha
(work hours reduced to approx. 40h/ha à €10)

+ Driver & tractor: approx. €50/ha
+ wear: €3.50/ha
x 3 hoeing passes

Total costs for 20 hectares:
approx. €27,210/year

Summing up on inrow

robocrop inrow brings noticeably greater flexibility and productivity to your operation, putting you in the position to do most of your hoeing mechanically without helpers, helping you reduce heavy reliance on seasonal labour. From a pure economical point of view, the investment pays off indeed.





robocrop babyleaf

Hoeing in closely spaced crops

The **robocrop babyleaf** lettuce hoe was designed for gentle inter-row hoeing in narrow rows.

- Very highest precision mechanical weed control at 5mm accuracy.
- Suitable in very narrow row spacings below 50mm.
- Steered flanged wheels for accurate inter-row guidance.
- Unique shares for minimal soil disturbance.
- Auto levelling for depth control.
- Custom colour spectrum for perfect contrasts between crop plants and weeds.
- Great reliability in very small baby leaf plants.

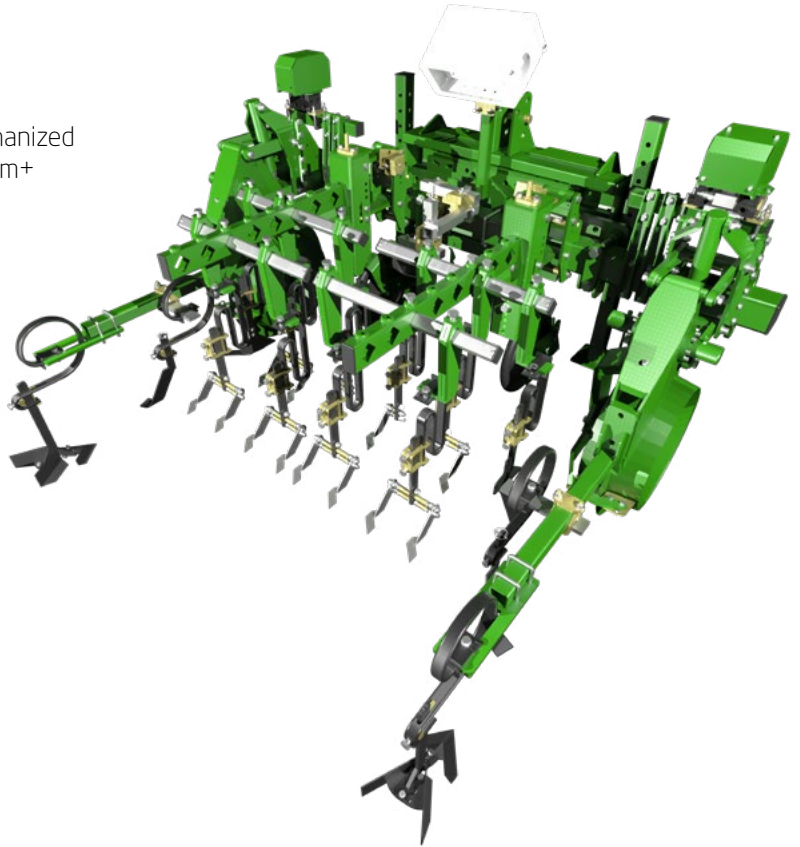
robocrop babyleaf

The royal class of precision

The **babyleaf** hoe was specifically developed for mechanized weeding in particularly narrow crop lines such as for 5cm+ row widths, greenhouses and fields.

The **robocrop** ^{4 QUICK TOUCH} terminal display screen shows the live image of an individual row. With cameras mounted in optimum positions, the system accurately separates individual rows from each other. The control system guides the shares up to 5mm to the plants.

This unique level of accuracy is unrivalled in the market and has earned us many international awards.



The **garford babyleaf** technology received the Arable Innovation Award Gold Medal at LAMMA 2019, the leading farm machinery show in the UK.



Exact cut

The specifically designed Y shares cut the weed with precision and minimum soil disturbance, allowing the shares to work extremely close along the plant rows. As an option, the **babyleaf** hoe can be equipped with Baby A shares, which are also made from stainless steel.

Hooded and band sprayers

Targeted spot application

robocrop enables high work rates at maximum precision. The exact camera guidance system is also great for applying liquid agrochemicals. The system is easily compatible with fertilizer application equipment as well as hooded and band sprayers. **robocrop** is flexible and extendable, such as by combining a row hoe with a hooded sprayer or **spotspray** system.

robocrop hoodspray

HOODED SPRAYERS

- Robust polyethylene hoods.
- Spring-loaded break-away system on each hood.
- Guide wheels give parallel link height control.
- Swing mechanism for quick and easy adjustment to different seed band widths.
- Each hood covers 12-65cm bands.
- Diaphragm valves.
- Nozzle holders with bayonet caps.
- Easy access jets for quick servicing.
- Option: In-soil crop protection shields.
- 80° precision nozzles for accurate application.

robocrop bandspray

BAND SPRAYERS

- Single or double nozzles.
- Special holders offer 4 setting options: height, angle, direction and spray width.
- Special liquid fertilizer applicators can be integrated in the crop protection shields for targeted application to the undersides of the leaves.

Combinations of hooded sprayers, band sprayers and liquid fertilizer systems are available.



robocrop spotspray

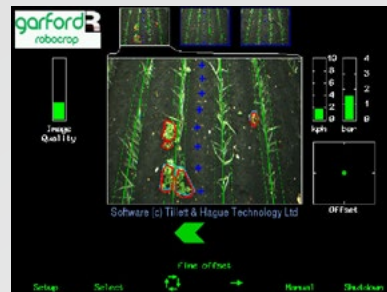
Targeted application to solitary plants

robocrop spotspray is based on the **robocrop inrow** technology. The system applies chemicals to solitary plants.

The **robocrop** camera system scans the foliage, detects inter-plant and inter-row weeds and applies a targeted spray.

Advantages of this type of application:

- Reduces chemical input by up to 95%.
- Minimizes losses.
- Effective and targeted use of agrochemical inputs.



garford robocrop

The pioneer in camera-controlled precision hoes



1986

Garford Farm Machinery Ltd. is founded by Norman Garford and his three sons Michael, Robert and Philip and Ted Chamberlain.



1997

The company starts developing a camera guidance system for row hoes in collaboration with Silsoe Research Institute.



2008

The **robocrop inrow** with rotary weeders is launched. The machine is the first to weed row crop fully automatically.



2010

garford wins the prestigious Queen's Award for its **inrow** weeders.



2015

The new electric eRotor drives make the **inrow** technology even faster, more accurate and more efficient.



2021

The **robocrop contractor** multi section technology brings hoes with up to 27 m working width to large scale farms - and makes hoeing even more flexible.

1985

A universal beet topper is developed as a retrofit header for the sugar beet harvesters.



1988

The trailed sugar beet harvester is launched. 3-, 4- and 6-row models of **victor** are manufactured and marketed worldwide until 2016.



2001

The **garford robocrop** camera guidance system is launched for grain, sugar beet and vegetable growing. This is the first auto controlled hoe that is able to work at high workrates.



2009

The **robocrop inrow** technology receives multiple awards. **garford** wins as many as 5 LAMMA medals in various categories.



2014

The **lineraiser** is the first automatic section control system on hoes.



2019

The new **babyleaf** hoe for mini lettuce bands and work widths from 5cm wins the LAMMA Arable Award in Gold.



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