AMAZONE

for Innovation 2024

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Our HIGHLIGHTS and award-winning innovations:

Contents

GO for Innovation

GO for Innovation

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IDEAS FOR OUR FUTURE ...

... practically implemented and resource-conserving

Professional farming and thus agricultural machinery demands are faced with major challenges today. On the one hand, agriculture needs to produce high-quality food to feed the growing world population. On the other hand, the amount of arable land on which food can be produced is being reduced. This is exacerbated by climate change with extreme weather conditions.

IDEAS FOR OUR FUTURE

Conservation of valuable resources and a sustainable reduction in the amount of inputs

In addition to saving resources, it goes without saying that the optimum use of inputs is of enormous importance. At the same time, increasing biodiversity must be an important goal, in order to offer good, long-term prospects for the generations to come.

Greater precision for higher yields, better sustainability and improved cost efficiency

The core objective, for agriculture and for AMAZONE, is to create a high level of yield per hectare of land using sustainable methods. It is therefore important to improve the efficiency of the production processes, especially by means of digitalisation and automation, and to treat each plant as precisely as possible. In which case, the level of precision found in seeding, fertilising and crop protection equipment must continue to increase, so that applications are increasingly carried out on a part-area basis and with the emphasis being placed more and more on each individual plant in the future.

AMAZONE wishes to make a decisive contribution to global food security with innovative solutions that provide our farmers and contractors with ideas which help them to secure their future on a sustainable basis.

As the **specialist for "Intelligent Crop Production"**, we are eagerly anticipating Agritechnica and cordially invite you to join us on our stand in Hall 9. We look forward to seeing you!

GO for Innovation

Regards
from the AMAZONE Team

Dr. Justus Dreyer
Chairman of the Board and Owner

Christian Dreyer
Chairman of the Board and Owner

AMAZONE trials area at Wambergen

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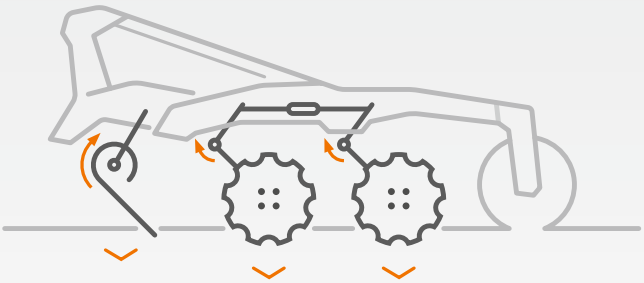
for Innovation 2024

Innovations in soil tillage

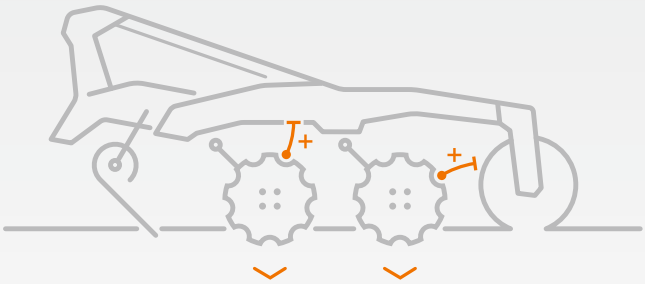
New AMAZONE Catros+ 03 compact disc harrows

in working widths from 4 m to 7 m and Smart Frame System

Catros+ 7003-2TS with knife roller and double harrow



Simple and uncomplicated setting and adjustment of the working depth



Huge through-passage, always perfectly adapted to the working depth

The Catros+ 03-2 models mean that AMAZONE now offers new folding mounted compact disc harrows in working widths of 4, 5, 6 and 7 m. In parallel, the trailed TS variant with bogey chassis is also available. The Catros is perfect for shallow and intensive mixing soil tillage. The low pulling power requirement combined with high forward speeds provides the scope for high work rates with low fuel consumption. The complete product range of the third generation includes working widths from 2.5 m to 12 m.

Smart Frame System – comfortable, quick and precise
The intelligent Smart Frame System frame concept is extremely user-friendly. This new form of working depth adjustment means that the machine needs to be aligned parallel to the field surface only once. The working depth is adjusted by simple rotation of the disc carrier arms. In this respect, the rows of discs are rotated away from the frame for a deeper setting or the discs are rotated towards the frame for shallower work. As a result, the machine frame always remains parallel to the soil, meaning that the machine works at the right depth at all times.

This is extremely comfortable when using the mounted machines, because the top link does not have to be corrected when adjusting the working depth. The system has a particular advantage in the case of the trailed models as the working depth adjustment has no impact on its combination with any front tools. In comparison to other machine concepts, where the working depth is changed by tilting the entire machine and thus the front tools have to be re-adjusted as a consequence, the Smart Frame System makes the task much easier and more efficient. The same applies also, for instance, when using following double rollers and harrows. As a result of the constant position of the frame, the rollers do not tilt when the working depth is changed, and the pressure is always the same on both rollers. Furthermore, the adjustment of the optional rear harrow also remains unchanged.

The deeper the work, the greater the distance between the frame and disc arm and the following roller. This provides optimum through-passage in the machine as a result of the higher clearance.

IDEAS FOR OUR FUTURE

- Simple and uncomplicated setting and adjustment of the working depth
- Completely independent depth adjustment of the front tools and the main working element
- The first and second row of discs always work at the same depth
- Convenient for quick changes to the working depth, such as working deeper in tramlines or on the headland
- Huge through-passage, always perfectly adapted to the working depth

Catros+ 7003- 2 with pro-Pack and double harrow

Catros+ 03-2 compact on the road

Thanks to the Smart Frame System, the working depth can be comfortably adjusted hydraulically from the cab when needed without compromising the result and without laborious readjustment. This offers the user maximum comfort, especially when working deeper for a short-duration such as in tramlines or on the headland. A fixed linkage between the two rows of discs ensures a uniform working depth of the disc element. The frame is also very clearly visible with an open design, meaning that easy monitoring of the implements is guaranteed.

Front tools for any application

The Catros+ 03-2TS trailed compact disc harrow with bogey chassis is divided into 3 sections: The optional front tools, the disc element and the following roller. A knife roller or Crushboard are offered as front tools. The extremely robust knife roller with maintenance-free bearings is ideal for shredding organic matter such as rape, sunflowers, maize stubbles or catch crops. The individual roller segments provide perfect contour following. The Crushboard can be selected as an alternative if the focus is on seedbed preparation.

The right disc for every requirement

With a disc diameter of 510 mm, the Catros+ permits working depths from 5 cm to 14 cm and is ideal for a wide range of applications from full-surface chitting of stubbles and seedbed preparation to medium-deep soil tillage and incorporation of organic matter and liquid manures. Depending on the main application, there is a choice between a smooth, fine-serrated or coarse-serrated disc. Furthermore, the X-Cutter disc, with a diameter of 480 mm, is available for the new Catros+ 03 for very shallow work from 2 cm to 8 cm. The wave profile guarantees full-surface movement and high mixing intensity at the same time.

Simultaneous incorporation of liquid manures with the pro-Pack

The simultaneous incorporation of liquid manures during application reduces nutrient loss and therefore protects the environment. For this purpose, AMAZONE offers the pro-Pack for the Catros+ mounted compact disc harrows in working widths of 5 m, 6 m and 7 m. A double harrow can also be used on machines with a working widths of 6 and 7 m. This allows faster drying and warming of the soil. The machine weight is, at the same time, reduced.

Long-lasting and maintenance free
The special maintenance-free face seals on the Catros disc bearings reduce maintenance requirements to a minimum and ensure high durability at the same time. The individual disc suspension means that the disc bearings are always located in the shadow of the soil flow, in order to protect them from wear and to generate a better through-passage. In addition to this, the pre-tensioned rubber spring elements and the individual disc suspension provide optimum contour following with maintenance-free overload protection systems.

Following rollers for many applications
Depending on the field conditions and needs, various following rollers and harrows can be selected from the wide AMAZONE range so as to achieve perfect reconsolidation.

Combination with the GreenDrill seeder box for the simultaneous sowing of fine seeds and catch crops is available as an option. Application is provided via baffle plates in front of the following roller.

AMAZONE Catros+ 5003-2 in stubble cultivation

The new Cenio 4000-2 folding, universally-adaptable mounted cultivator

Three-row Cenio 4000-2 for optimum incorporation of crop residues

Cenio 4000-2 with C-Mix Super tines

AMAZONE will present the new Cenio 4000-2, a folding mulch cultivator in a 4 m working width, at Agritechnica 2023. The introduction of this new model means that the Cenio product range, which has so far consisted of the 3 m, 3.5 m and 4 m rigid machines, has now been complemented by the 4 m hydraulic-folding variant. The Cenio can be used with tractors from 105 to 275 hp.

The tine element – optimum incorporation of crop residues and soil loosening
The 3-point linkage mounted Cenio is a three-row mulch cultivator which can be used universally by interchanging of the various shares at depths from 5 to 30 cm. As a result, the cultivator can be optimally used for both shallow stubble cultivation as well as medium-deep and deep-loosening soil tillage. With a tine spacing of 30 cm, the Cenio works without any blockages, even where large amounts of crop residues prevail, and evenly mixes the organic matter into the soil.

C-Mix Special tines and C-Mix Super tines
The Cenio, in the Special version, is equipped with shear bolt overload protection. It is also available in the Super version with its spring overload protection and a trip force of 500 kg.

This spring overload device provides optimum protection for the Cenio in stony conditions, and the tines easily hold the pre-set working depth, even under hard conditions.

Soil-engaging parts for a wide range of applications
The share variants from the C-Mix-3 system are available as soil-engaging parts for the Cenio. The 320 mm wide duck-foot share or the 360 mm wide C-Mix wing share can be used for the full-surface cutting in stubbles. The 100 mm or 80 mm wide C-Mix share can be used for primary soil tillage and the 40 mm wide C-Mix share for deep loosening down to 30 cm. The extensive selection of shares means that the Cenio can be used universally on the farm across a variety of applications and its effectiveness exploited to the maximum.

Comfortable adjustment for optimum working results
The depth adjustment is carried out fully hydraulically from the tractor cab on the Cenio 4000-2. The depth of work can be tailored to suit the field and soil conditions on the move using the hydraulic depth adjustment. An easy-to-read scale is used for orientation.

Safely on the road with the Cenio 4000-2

The working profile is always left smooth thanks to levelling discs
A disc element with fine-serrated, 410 mm diameter concave discs is available for levelling the soil behind the tines. The discs have a high self-driving effect combined with good crumbling of the soil. Furthermore, the bearings are maintenance-free.

Due to the automatic disc levelling system, the height of the levelling unit is automatically adjusted via the parallelogram linkage when the working depth of the tines is changed. This means that the levelling quality always remains the same, even when the working depth is changed, and the driver's workload is further reduced.

The right roller for every soil type
There is a choice of 7 rollers for reconsolidating the soil. The ideal roller for the respective operating conditions is always available as a result of the wide choice of following rollers. In the event of widely varying fields on a farm, the roller can be exchanged with the minimum of effort thanks to the quick-change system. In addition to this, the rollers can be supplemented by a single-row harrow system as an option.

The new 4 m, hydraulically-folding Cenio means that a universal and flexible cultivator with first-class performance is now available, even for small fields.

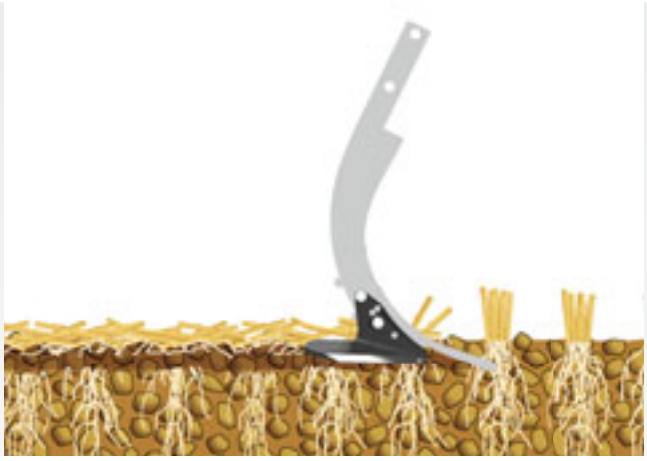
IDEAS FOR OUR FUTURE

- Varied range of application from shallow stubble cultivation to topsoil deep loosening thanks to a wide range of shares
- Comfortable adjustment from the cab thanks to the standard hydraulic depth adjustment
- Uniform levelling as a result of the automatic adjustment of the levelling discs when the depth of work is changed
- Long service life due to the robust frame design
- Targeted reconsolidation under all conditions due to the extensive roller range

The right reconsolidation for every soil from the large selection of following rollers

New AMAZONE 360 mm wing share for Cenio and Cenius mounted cultivators

AMAZONE 360 mm wing share with three different mounting positions



The new 360 wing share enables shallow work and cutting of the organic matter in Position 1.

Optimum pull-in, thanks to the improved undercut of the point in Position 2, even in extremely dry soils.

The new AMAZONE wing share for the Cenio and Cenius mounted cultivators is now available in a width of 360 mm. The wing share also enables full-surface and shallow cutting of stubble with a mulch cultivator, thereby breaking the capillarity of the soil. This reduces the drying of the soil in the summer. Furthermore, volunteer grains and weed seeds have perfect germination conditions as a result of the shallow cultivation.

Wing share with 3 different mounting positions
The 360 mm wide wing share can be fixed to the tines on the Cenius and Cenio mounted mulch cultivators in 3 different positions and thus with various heights and angles.

The wing share can be mounted in the lowest of the series of holes in the tines for shallow cutting of cereal stubbles. In this case, the wing share is almost parallel to the soil, which allows shallow working from 5 cm to 15 cm.

If the soil is very hard due to dry conditions, it may be more difficult to pull in a mulch cultivator with this very low attachment of the wing share. The second mounting position of the wing share is provided for this reason.

The wing shares are bolted on slightly higher in this position than in the first hole. As a result of the higher mounting position, the point works deeper than the wing share and thus generates a higher undercut with easier pull-in.

The third mounting position of the wing shares is available for a more intensive incorporation and mixing of the soil. In this position, the wings are set at a steeper angle of attack compared to the second position. This angle of attack causes the organic matter to be mixed even more intensively into the soil by the cultivator, further promoting the decomposition process.

The 3 mounting positions of the wing shares enable the mulch cultivator to be used even more universally on farms, especially on those with very variable soils.

IDEAS FOR OUR FUTURE

- Enables more universal use of the mulch cultivator
- Improves the working quality when full-surface cutting of stubbles as a result of the shallow angle of attack of the wing.
- Optimum pull-in behaviour, even in extremely dry conditions, owing to the steep angle of attack of the share
- Increase in the incorporation of crop residues

The steep angle of attack in Position 3 enhances the mixing of the organic matter in the soil.

New double harrow for the Cobra shallow cultivator

Weed control with the Cobra shallow tine cultivator in combination with the double harrow

The AMAZONE Cobra with the double harrow making a second pass for the control of volunteer grains and weeds

The double harrow provides improved lateral distribution of the straw after combining

Thanks to the double harrow, the soil is separated from the volunteer grains and the bare plants deposited on the surface. There the plants dry off in the sun

The 6-stagger Cobra shallow tine cultivator is characterised by its flexibility in respect to stubble cultivation and can be used for that slightly deeper second and third tillage pass as well as for catch crop destruction and seedbed preparation.

Mechanical weed control during that second pass is becoming more and more important for field hygiene as a result of increasing resistance and the reduced availability of plant protection agents.

Double harrow
In addition to a choice of 9 AMAZONE following rollers as double or single units, a double harrow is now available as a follow-up tool for reconsolidating the soil.

The double harrow really comes into its own in mechanical weed control during the second or third pass. The weeds or volunteer grains cut down by the duckfoot shares are deposited on the soil surface by the double harrow. Furthermore, the vibration of the harrow tines separates the soil from the roots of the weeds and volunteer grains. The harrow pulls the roots out of the soil.

Separating the soil from the roots and then depositing them on the surface means that the weeds and volunteer grains dry out in the sun.

In addition, the double harrow facilitates levelling and improved distribution of the straw on the field. The soil can also warm up and dry more quickly in the spring owing to the reduced level of reconsolidation.

When working with the double harrow, the depth of the machine is controlled via the 4 integrated support wheels at the front and via the TX transport running gear at the rear. The hydraulic connection of the support wheels to the running gear also enables the working depth to be infinitely adjusted whilst the machine is in work when using the double harrow. A tine is mounted behind each of the transport wheels in order to loosen any compaction caused by the running gear.

IDEAS FOR OUR FUTURE

- Mechanical weed control thanks to full-surface cut and trailing double harrow
- Improvement in field hygiene and reduction in the use of plant protection agents
- Supplementary straw distribution and soil levelling
- Faster drying and warming of the soil in the spring

The new Comfort hydraulics with ComfortClick for the Teres 300

Easily understandable pre-selection of the adjustment functions.

Front furrow, furrow width and furrow depth – maximise the potential of the comfort hydraulics.

ComfortClick – provides a clear display for comfortable operation.

The Teres 300 not only stands out due to its quality of plough profile but also by its hydraulic adjustment options. In addition to the usual turning over of the plough, the front furrow, overall furrow width and furrow depth can all be hydraulically adjusted using individual double-acting spool valves. In order to be able to use all of these functions comfortably via the tractor, a total of four double-acting valves, plus one single-acting spool valve for overload safety protection, are required for a fully-specced Teres 300 VS. AMAZONE has developed the Comfort hydraulic system for the Teres, so that these adjustment possibilities can also be used on a tractor with only 2 or 3 spool valves.

Comfortable pre-selection of the adjustment functions
The electric pre-selection box and an electric hydraulic control block mean that several functions can be operated with just one spool valve. The functions for adjusting the furrow width, furrow depth and the front furrow can then be individually selected with the rotary switch on ComfortClick. This provides comfortable operation and adjustment of the Teres 300 with only two double-acting spool valves. The third spool valve, which is usually present, can therefore continue to be used for the hydraulic top link.

Thanks to the new Comfort hydraulics, the AMAZONE Teres 300 offers maximum operating comfort and reduces the demands required when coupling to any tractor.

IDEAS FOR OUR FUTURE

- Full operating comfort of the Teres 300 with just one spool valve
- Comfortable adjustment from the cab
- Reduced demand required when coupling

New Teres 300 stepped adjustable plough

Stepped adjustable plough with manual furrow width adjustment and extension of the SpeedBlade plough body range

Teres 300 stepped plough with 5 furrows in work

Optimum front furrow adjustment thanks to hydraulic front furrow adjustment

The new models mean that the previous Teres offer has been extended by the stepped adjustable ploughs with manual furrow width adjustment. The Teres was introduced as the new AMAZONE mounted plough in 2022, initially only with variable furrow width adjustment.

The new stepped ploughs are an excellent solution for farms which do not wish to adjust the furrow width in the field. AMAZONE now offers a Teres mounted plough with 4, 5 or 6 furrows with variable furrow width adjustment or manual furrow width adjustment for tractors up to 300 hp. The furrow width can be adjusted to 35, 40, 45 or 50 cm for each plough body in the new Teres stepped ploughs.

The plough is characterised by its simple adjustment, low pulling power requirement and perfect working profile. In addition, the new plough bodies ensure reduced wear costs, even at higher speeds.

Simple and comfortable adjustment for a perfect working profile

The Teres 300 and 300 S are equipped with manual furrow width adjustment as standard and hydraulic front furrow adjustment as an option. This means that the front furrow can be conveniently adjusted from the cab and also adapted to suit varying soils and when working on slopes.

The parallelogram arrangement in the settings centre is a real advantage in terms of comfort and precision. It means that the pull point does not have to be re-adjusted when the front furrow is adjusted. Here the pull point is automatically adjusted via the parallelogram.

Innovative SpeedBlade plough bodies

The new SpeedBlade plough bodies with the patented extra-large front shin of the mouldboard are also fitted to these models. The SpeedBlade plough bodies are characterised by minimal wear on the main mouldboard. The main wear point automatically shifts further and further back towards the centre of the plough body when increasing the working speed from say 6 km/h up to 8 km/h. As a result, the main wear point of the SpeedBlade plough body is kept on the enlarged front shin of the mouldboard and not back on the main part of the slatted or solid mouldboard, even at these higher forward speeds.

This means that only the front shin of the mouldboard needs to be replaced in the first instance on the Teres when used at higher speeds. This enormously reduces wearing costs compared to other designs.

Teres 300 with side-mounted support wheel for optimum ploughing at the hedge side

In addition to this, the SpeedBlade plough bodies are extremely hard owing to the unique ©plus hardening process and the introduction of carbon and are therefore highly wear-resistant. For example, a very high hardness and thereby a smooth surface is achieved on the front of the mouldboard. This reduces the pulling power requirement and therefore the fuel consumption. At the same time, this process ensures long service times and short downtimes. The back remains relatively soft but at the same time extremely tough and impact resistant.

Various bodies, skimmers and disc coulters are available for a variety of operating conditions.

Durability and longevity
The Teres has a robust beam which measures 150 x 150 x 8.8 mm. The large hollow turnover shaft with a diameter of 130 mm permits two bearings of the same size. This markedly increases durability.

The Teres is also equipped with the ProtectShaft cross-shaft with an integrated lower link balls. The pivot bearings have a dampening effect and protect the plough on the headland and when driving on the road.

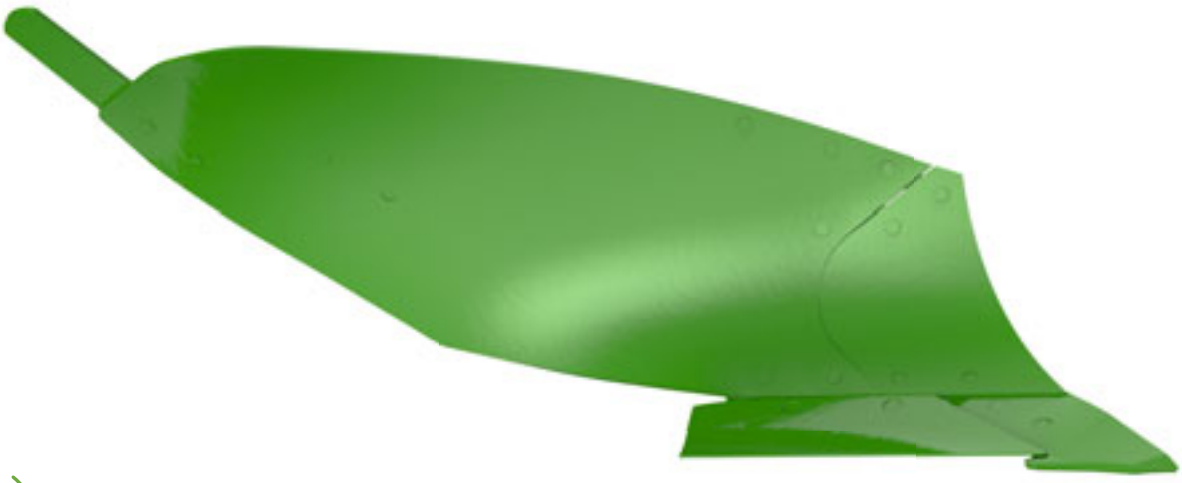
There are two variants for the Teres when it comes to overload safety protection. One is the shear bolt overload safety device with a shear force of 4,400 kg, and the other is the hydraulic overload protection device for more intense and stony operating conditions.

The furrow depth adjustment is either carried out manually or hydraulically via the support wheel. In this respect, AMAZONE offers both side-mounted pendulum and combination support wheels as well as the pendulum support wheel for the new Teres models. The Teres range also includes various tyres with a variety of diameters and profiles for exact depth control and effective self-driving. A specially developed AS tyre with dimensions of 785 x 350 mm is available for particularly demanding conditions for depth control.

Extension of the SpeedBlade plough body range:
The body range of the Teres 300 and Tyrok 400 has been extended by the WXL 35 SpeedBlade plough body. The actual body profile is already very well-known from the Cayros and has proven itself when used in the appropriate soils. However, the WXL 35 also has the enlarged front shin of the mouldboard, whereby the body is wear-resistant, even

at the increasing forward speeds. The main wear point is always on the front shin of the mouldboard and not on the complete body, even at higher forward speeds. As a result, only the front shin has to be exchanged in the first step, which cuts costs enormously.

The heavily scrolled mouldboard means that the WXL 35 is ideal for many soils, especially medium to heavier soils. In addition to this, it is characterised by good furrow clearance and an exceptionally low pulling power requirement. The WXL 35 brings its strengths to bear particularly in the case of high crop residues and large quantities of organic matter.



IDEAS FOR OUR FUTURE

- New stepped plough with simple manual furrow width adjustment
- High levels of efficiency owing to high forward speeds with minimal wear thanks to the SpeedBlade plough body with enlarged front shin of the mouldboard and ©plus hardening process
- No pull point adjustment required when changing the furrow width setting
- High durability thanks to the shock-mounted ProtectShaft cross-shaft
- Simple adjustment of the front furrow thanks to optional infinitely variable hydraulic adjustment

New AMAZONE Tyrok 400 Onland semi-mounted reversible plough

On-land ploughing with the new AMAZONE Tyrok 400 Onland semi-mounted reversible plough

Video: Tyrok Onland in work
www.amazone.net/yt-tyrok-onland

AMAZONE Tyrok 400 combined with a swivel press arm and packer

AMAZONE is now offering the Tyrok 400 semi-mounted reversible plough for on-land ploughing. The Tyrok Onland provides a high level of flexibility as a result of the quick and easy change between on-land or in-furrow operation. The new models are offered with a choice of 7, 8 or 9 furrows for tractors of up to 400 hp.

Easy change between on-land and in-furrow
The tractor size and the size of the tyres determine, amongst other things, its operation in the furrow or on and beside the furrow. In particular, its use with tracks, dual wheels or extra wide tyres larger than 710 mm does not allow for driving in the furrow without compaction damage on soil which has already been partly ploughed.

A major advantage of on-land ploughing is the reduced soil pressure as a result of the large contact area of the wide tractor tyres and the possibility of being able to work with a lower tyre pressure. This means that considerably less compaction damage is caused. Furthermore, on-land operation provides an improved pull line as a result of the reduced lateral pull and more efficient power transmission. GPS guidance systems can also be used for maximum working comfort and for a precise match-up to the next furrow. Constant depth control is provided via the front guide wheel, which runs permanently on the unworked soil.

Other factors, such as the soil conditions, have a critical impact on the method of ploughing. A quick and easy change between on-land and in-furrow operation is therefore extremely important. If the soil surface in the field does not allow for optimum traction as a result of rain or wet conditions, quick conversion to in-furrow operation is possible at any time. A twist of the hydraulic lever on the turnover arm is all that is required for this.

Pure robustness without compromise
The Tyrok Onland has a substantial, high-tensile rectangular steel beam in dimensions of 200 x 150 x 10 mm. This gives the Tyrok Onland an extremely high level of rigidity. A decisive advantage over a square beam is that the beam does not bend, even under hard soil conditions. This ensures a uniform working depth over the entire length and working width, which is crucial, especially at the larger furrow widths.

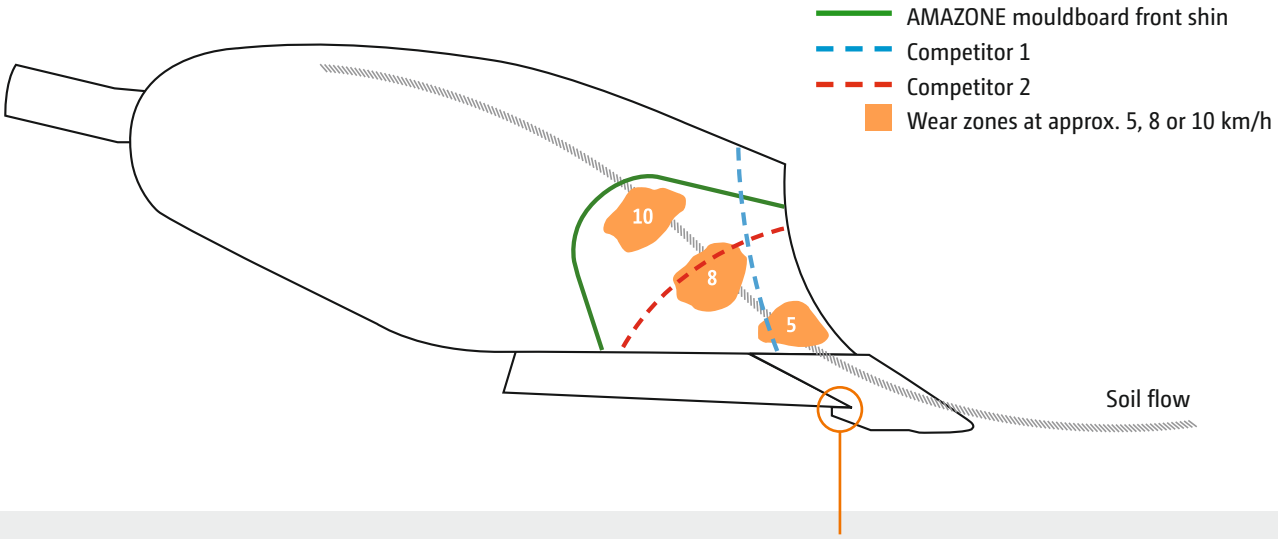
The Tyrok Onland also scores with its SmartTurn system. On the headland, the fast turning procedure is hydraulically slowed down two-fold just before the end. This results in a damping effect which reduces stress on the plough structure when the cylinder is retracted. There is no need to compromise on speed. In the Onland variant, the “beam” is automatically retracted via the Onland cylinder before the turnover process,

so that the turnover centre of gravity is as low as possible and the forces acting on the tractor and plough are kept to a minimum.

Plough bodies meticulously thought-through – SpeedBlade for less wear
The **SpeedBlade plough body**, with its patented extra-large front shin on the mouldboard, makes for minimal wear on the shin. The main wear point automatically shifts further and further back towards the centre of the plough body when increasing the working speed from say 6 km/h up to 8 km/h. As a result, the main wear point is kept on this enlarged front shin of the mouldboard and away from the main mouldboard, even at high forward speeds; Various slatted and solid mouldboard profiles are available depending on the application and objective.

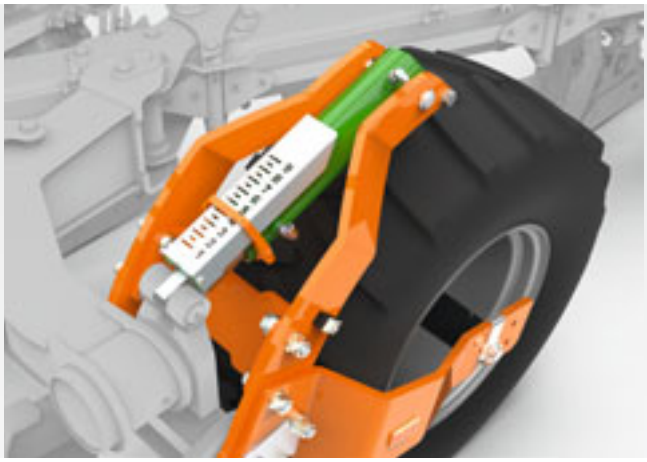
Another detail with great effect: the point covers the blade, meaning that the joint is protected by the point. Thanks to this clever join up, no plant residues or baler twine can get entangled.

AMAZONE sets the highest standards in the manufacture of plough wearing parts with its unique ©plus hardening process. The additional introduction of carbon makes Tyrok wearing parts far harder and more durable.



SpeedBlade body U 40

The point covers the wing:
- The joint is therefore protected by the point
- Plant residues, baler twine, wire and root residues cannot get entangled



Easily visible scale on the cylinder

Safe, comfortable and precise adjustment for a perfect working profile
The Tyrok Onland is equipped with manual furrow width adjustment as standard. As an option, the furrow width can be infinitely adjusted hydraulically to suit the conditions from the comfort of the tractor cab. The front furrow can also be adjusted manually or hydraulically for precise matching to the last furrow. An advantage here is the direct linkage of the front furrow cylinder at the front of the plough, even while driving.

Electro-hydraulic furrow depth adjustment for the Tyrok 400
The furrow depth on the Tyrok 400 can be adjusted fully hydraulically from the tractor cab thanks to the new electro-hydraulic furrow depth adjustment.

The spool valve in the tractor cab can be used to steplessly adjust the furrow depth in line with the soil conditions while driving. In this regard, lifting at the headland and changing the furrow depth on the plunger cylinder can be selected electrically. This pre-select function enables the two functions to be actuated on the Tyrok via a single-acting spool valve. An easily visible scale on the cylinder serves as an indicator when changing the furrow depth.

The electro-hydraulic furrow depth adjustment means that furrow depth adjustment is easier than ever and the comfort for the driver yet further enhanced.

IDEAS FOR OUR FUTURE

- High flexibility thanks to the quick and comfortable change between on-land and in-furrow operation
- In addition to precise matching to the last furrow via GPS, on-land operation reduces the pressure on the soil as a result of the larger contact area of the tractor tyres
- Electro-hydraulic furrow depth adjustment from the tractor cab
- The AutoAdapt hydraulic front furrow adjustment is fitted as standard and provides perfect matching to the last furrow, even under varying conditions
- Unique SpeedBlade plough bodies with an enlarged front shin of the mouldboard and the ©plus hardening process allow higher speed with less wear
- Fast turning with low stress as a result of the SmartTurn twin-stage hydraulic end position damping

Optimum soil protection thanks to the Tyrok 400 in on-land operation and the wide tractor tyres

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Innovations in seeding

New Centaya-C Special harrow-mounted seed drill with twin-chamber hopper

The split hopper of the Centaya 4000-C Special simultaneously applies two materials into the seed slot using the single-shoot process.

Centaya 4000-C Special with double hopper in the ratio of 70:30. This enables two different materials to be metered separately.

Both materials are individually metered via 2 metering units and transported to the segmented distributor head via the conveying system. This has the advantage that the metering cassette can be chosen separately for each material.

After AMAZONE introduced the Centaya-C Super harrow-mounted seed drill for combined grain and fertiliser sowing in autumn 2022, the Centaya Special pneumatic harrow-mounted seed drill now follows as the smaller version. The machine has a hopper capacity of 1,500 l and is equipped with a twin-chamber hopper. AMAZONE offers the Centaya-C Special in working widths of 3 m, 3.5 m and 4 m.

Efficient use of inputs

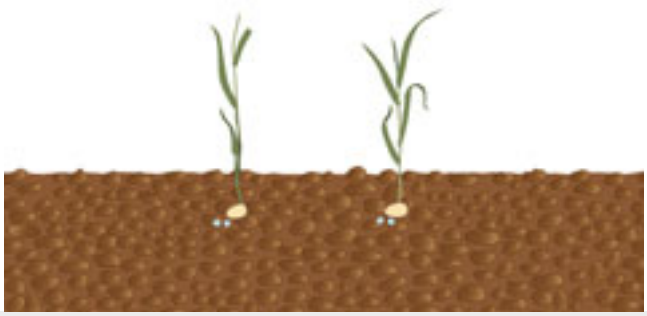
The hopper capacity of the Centaya-C Special of 1,500 l is divided in the ratio of 70:30. This enables two different materials in volumes of 1,050 and 450 l to be filled. The various materials that can be applied are metered separately and **precisely** in the ISOBUS-controlled Centaya-C Special. The harrow-mounted seed drill with its infinitely variable electric metering allows seed rates of 0.5-400 kg/ha at a working speed of 10 km/h.

The conveying system feeds the applied materials to the coulters via the segmented distributor head. The simple conveying system transports the seed and the fertiliser to the coulter using the single-shoot process. The seed and the fertiliser are then sown into the soil via the coulter.

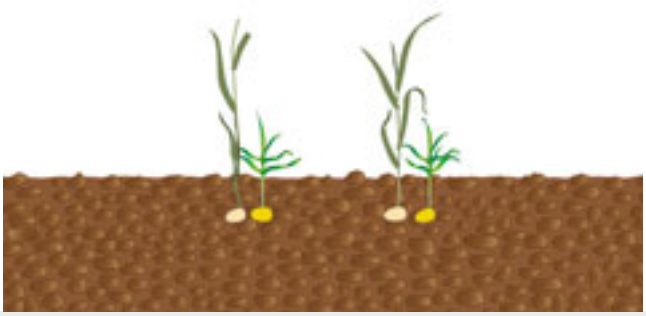
The combined application of seed and fertiliser promotes the seedling development in cereal crops. The seed and the fertiliser are applied together into the soil for effective use, meaning that the fertiliser is quickly made available to the plant.

Two different seed types can also be applied. For example, different seed rates can be metered and applied with the appropriate metering cassettes.

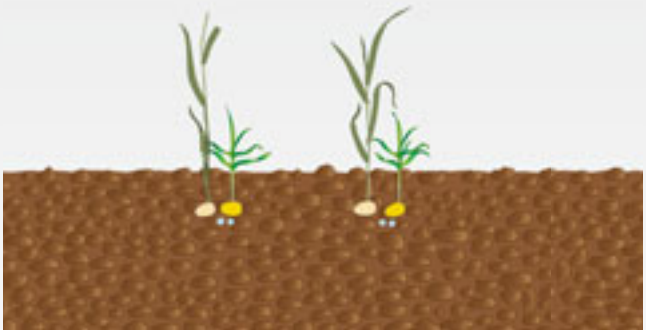
The Centaya-C Special can be equipped with the Micro plus micro-granular applicator. The 110 l hopper can also be mounted on the pneumatic harrow-mounted seed drill. In this case, the material in the Micro plus hopper is fed into the main conveying system of the Centaya-C Special and is also applied using the single-shoot process.



Single-shoot: sowing seed with fertiliser at one placement depth



Single-shoot: sowing two seed types at one placement depth



Sowing two seed types. A third material is metered via the Micro plus spreader and integrated into the conveying system.

It therefore enables the driver to apply a third material in the same pass. It is used for metering small quantities of materials, such as micro-nutrients or low seed rates.

The large hopper opening enables comfortable filling, and the seed hopper as well as the individual metering units can be easily reached via the loading board. The machine can be equipped with a quick-emptying device for fast seed changeover between jobs. A storage rack can be ordered as an option to accommodate additional sacks of seed.

The 1,500 l split seed hopper means that the Centaya-C Special is extremely productive. The hopper profile ensures a low lifting power is required, since the metal seed hopper is tilted a long way forward towards the tractor.

2 coulter systems, 2 row widths
AMAZONE offers the harrow-mounted seed drill in working widths of 3 m, 3.5 m or 4 m with either the RoTeC single disc coulter or TwinTeC Special double disc coulter. The machines can be ordered with a row spacing of 12.5 cm or 15 cm (in working widths 3 and 4 m) depending on the customer requirement.

QuickLink quick coupling system
The Centaya-C harrow-mounted seed drill can be combined with the various soil tillage implements via QuickLink. Depending on the requirements, the Centaya can be coupled with a KE rotary harrow or a KX or KG rotary cultivator. It is also possible to combine the Centaya with the CombiDisc compact disc harrow on very light soils.

IDEAS FOR OUR FUTURE

- One pass – the application of up to 3 different materials
- Concurrent establishment of the crops
- Quick seedling development
- Each material to be conveyed is metered separately – perfect metering

Centaya 4000-C Special mounted on a KG 4001 rotary cultivator. The soil is well mixed and loosened and the seed neatly placed in the sowing horizon via the TwinTeC double disc coulter.

The new Cirrus 9004-2C Grand trailed cultivator drill

The new Cirrus 04 trailed cultivator drill
Precise – Flexible – Efficient

Cultivator drill for large-scale farms and contractors
AMAZONE has extended its large area seed drill range with the new Cirrus 9004-2C Grand trailed cultivator drill. The machine is offered in a working width of 9 m and a row spacing of 16.6 cm.

At first glance, the seed drill stands out due to its striking design. This is largely determined by the large seed hopper and the distinctive distributor head.

Designed for solving current and future challenges in agriculture, the machine is characterised by its precise, flexible and efficient operation. Due to its easy adaptability to various field management concepts, it opens the door to future arable farming.

Solutions for an efficient method of cultivation
As standard, the Cirrus 9004-2C Grand is equipped with a twin-chamber hopper, which is split in a ratio of 60 : 40. The total hopper capacity, which is optimised for big bags and has sufficient overcapacity, is 5,750 l. The overcapacity means that it can be filled when convenient. The hopper can always accommodate the entire contents of a big bag, even with large residual amounts. This simplifies seed logistics, since the time of filling can be selected more flexibly.

The twin-chamber hopper enables the separate metering of different types of seeds or fertiliser. The two hopper chambers can be filled with just one material, if required, for maximum output. Exact distribution is guaranteed by the pressurised hopper system with its high-performance conveying system. Up to 400 kg/ha can be efficiently applied at a working speed of 15 km/h. Furthermore, the low power requirement of the blower fan underlines the enormous efficiency of the machine. A TwinTerminal can be used for the simple and precise calibration of the metering unit.

The loading reach can be considerably reduced by half-side folding during loading, in order to enable the machine to be loaded via smaller telescopic loaders.

Flexibility for versatile farming
In general, the materials metered from both hopper chambers are embedded at one placement depth in the seed furrow by the same conveying system using the single-shoot process.

In this respect, the new distributor head provides excellent lateral distribution. The single row shut-off ensures high sustainability via a reduction in the use of seed and fertiliser.

Extremely vigorous crops develop as a result of the spot-accurate shut-off, especially in the overlap zones, since no areas are double sown. Overlaps are restricted to less than 1 % of the area with this system.

The distributor head can be easily tailored to any symmetrical and asymmetrical tramline systems as well as track widths and tyre widths via the ISOBUS terminal, in order to create a tramline. Mechanical intervention is not required.

If single rows are closed, the rotational speed of the metering units is reduced. The excess seed circulates in the seed return, while the air continues to escape towards the sowing coulter. The air pressure in the seed delivery lines therefore

Half-side folding during loading considerably reduces the loading reach and also allows the machine to be filled via small telescopic loaders

The working width of 9 m and high working speeds permit efficient use of the machine

remains constant. This prevents seeds from being blown out of the furrow. At the same time, there is always a sufficient quantity of seed in the distributor head. This is charged immediately after the machine has been lowered. Uninterrupted application of the products without pre-metering is guaranteed right down to the last corner of the field.

Precision over the entire width
Precise depth placement is required for even field emergence. The TwinTeC plus double disc coulter impresses due to the large disc diameter and a coulter pressure of up to 100 kg. The coulters are characterised by their smooth running, even at high forward speeds. The combination of coulter profile and coulter pressure is the key to a consistent quality of work and high productivity.

The electro-hydraulic remote control of the coulter pressure and the sowing depth allows easy adjustment to varying soil conditions. The user-friendly adjustment is provided from the cab via an ISOBUS terminal. Turning crank handles or inserting clips is a thing of the past. The improved adjustment means that changeable soil conditions can be quickly responded to with the positive effect of uniform crops across the full working width.

Perfect growth conditions for the plants
AMAZONE's successful concept of reconsolidation in strips has also been incorporated in the Cirrus 04. The principle is also known as the "sowing insurance" and has been gaining ground since 2004. The Matrix profile tyres only reconsolidate in strips where the seed will subsequently be placed in the soil. The intermediate zones are reconsolidated less heavily. This promotes the optimum gaseous exchange and allows rainwater to quickly permeate into the soil.

The combination of a high tyre diameter and cross ribs on the profile enables a good self-driving effect and makes the machine easy to pull.

The tyre packer is mounted offset, and together with the leading ridge levellers, creates a level seedbed. In addition, the risk of a stone blockage is reduced to a minimum, which has a positive effect on operational reliability.

Changing soil conditions can be quickly responded to via the remotely-adjustable seedbed preparation tools. Large clearances promote a smooth soil flow, in order to create an optimum seedbed on all soils irrespective of the location.

Safe on the road at up to 40 km/h

Comfortable on the move
The manoeuvrability of the machine plays a key role in the quick sowing of headlands, wedge-shaped fields as well as small and irregularly shaped fields. The independent suspension allows the Cirrus 9004-2C Grand to be pulled around curves and manoeuvred in field corners with minimal effort. In this respect, each wheel turns independently of the others and can flexibly adjust the running speed and direction with a turning angle of up to 90°. This low-stress turning process protects the machine from excessive load and wear. Furthermore, the soil is prevented from bulldozing when negotiating bends. Consistent seedbed quality and maximum soil structure protection are ensured.

The large volume of the tyre packer wheel provides comfort when driving on the road. Any rocking at 40 km/h is prevented, since the machine runs on only 4 wheels. The high carrying capacity of the wheels allows the middle pair of wheels to be lifted up between the 4 transport wheels.

A flexible connected implement in combination
If required, the tractor track can be loosened with the wheel mark eradicators which are mounted on an intermediate frame between the drill and tractor. The wheel mark eradicators loosen but do not mix. The soil-engaging parts are hydraulically swivelled up when driving on headlands. The wheel mark eradicator can be used in combination with the leading tyre packer.

Combination with a wide variety of implements for seedbed preparation is also possible, e.g. with a Catros compact disc harrow.

IDEAS FOR OUR FUTURE

- Distributor head with individual row shut-off
- Large hopper capacity optimised for big bags
- User-friendly, electro-hydraulic adjustment of the sowing depth and the coulter pressure via ISOBUS terminal
- Strip-wise reconsolidation for higher field emergence and more uniform crops


AMAZONE

New AMAZONE Precea-TCC trailed precision air seeder

The new Precea-TCC trailed precision air seeder sets the standards in precision, output and intuitive operation.

Video: Precea-TCC in use
www.amazone.de/yt-precea-tcc

The feeding of the individual rows from the central hopper is controlled by the Central Seed Supply system

Precea-TCC – high work rates with maximum precision

AMAZONE is expanding its range of precision seeders with the new trailed Precea 9000-TCC and 12000-TCC models, in working widths of 9 and 12 m respectively. This variant, which has been developed specially for large-scale farms and contractors, stands out with its high-performance overpressure singling, large tank capacities and innovative Central Seed Supply seed delivery system. The high-precision seed placement ensures optimum field emergence, even at increased forward speeds of up to 15 km/h.

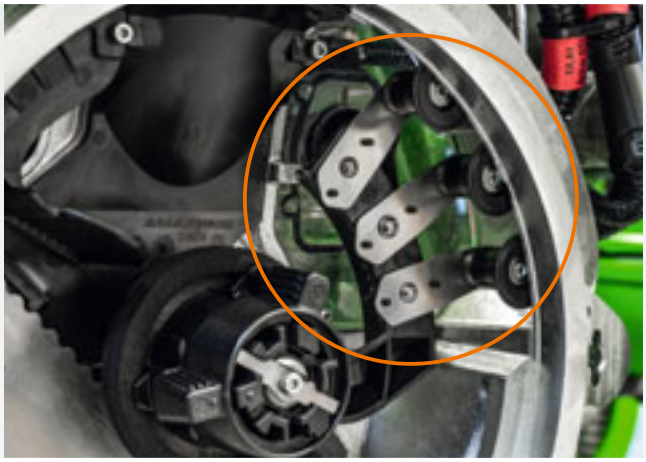
Central hopper concept – row-by-row singling

For exceptionally high work rates and reduced fill times, the new Precea-TCC features a central seed hopper with a capacity of 2,000 l for up to two big bags. The new Central Seed Supply seed delivery system carries the seed from the central hopper to the singling units via an air stream. There, the seed for each row is temporarily stored in a small reception unit. Once this reception unit reaches the maximum fill level, the air stream is automatically cut off,
thereby shutting off any further seed supply. When the fill level decreases, the air stream restarts automatically and conveys seed again from the main hopper to the individual rows. Thanks to the intelligent air stream system of the Central Seed Supply, every singling unit is independently supplied with seed, without the need for complex sensor systems or electronic controls.

Precise singling across all rows

For seed singling, AMAZONE uses its precision PreTeC singling units, whose functionality is based on the overpressure principle. This means the seed is pressed against the singling disc by air pressure. The seal rotates along with the singling disc, which considerably reduces the power consumption of the electric drives across the individual rows. The remotely controlled, automatic SmartControl stripper finger adjustment is coupled with the optical sensors and effectively prevents any misses or doubles. Meanwhile, the electrically-driven singling disc turns in relation to the forward speed and desired seed rate; conveying the seed towards the propulsion channel. At this point, the contact

Precea-TCC trailed precision air seeder – sets new standards in precision and output



The SmartControl automatic stripper adjustment takes over the setting of the stripper fingers and removes a considerable burden from the driver

AMAZONE ISOBUS control of the Precea models. All the important parameters at a glance!

pressure is broken, the seed is shot precisely into the seed furrow, caught by the catcher roller and then securely embedded in the furrow bottom.

The furrow formers ensure the precise seed placement. Two carrying rollers and the high-down force, hydraulically adjustable coulter pressure ensure uniform depth control. For even greater convenience, AMAZONE offers the SmartForce automatic coulter pressure regulation. This ensures that the set contact force remains constant for a consistently uniform seed placement, especially in variable soil conditions.

The ElectricDrive electric metering drive allows the desired seed rate to be conveniently set via the ISOBUS terminal and serves as the basis for precise, part-area, site-specific rate control using GPS and field zone maps. In addition to this, Section Control actively saves seed row-by-row in wedge-shaped fields and on headlands, particularly useful at these large working widths. Ideal conditions are also provided for mechanical weed control with a hoe.

Even field emergence as a result of the telescopic axle where the tyres run between the seed rows

The easy access to the hoppers provides quick and easy filling

CurveControl –
Optimised seed placement when driving round bends
The electric metering drive to the individual rows makes it also possible to maintain an evenly-spaced placement across the entire working width, even when driving round bends. A yaw sensor is used to calculate the difference between the forward speed on the inside and outside of the bend. The innovative CurveControl then adjusts the speed of the each singling disc accordingly, ensuring that the seed spacing remains uniform, even when seeding around bends. The even spacing allows the plants to be adequately supplied with nutrients. This results in uniform crops and ensures even ripening.

Twin-chamber hopper for fertiliser
For the simultaneous application of fertiliser, the Precea-TCC is equipped with an easily-accessible, twin-chamber hopper with a total filling volume of 6,000 l. Each hopper chamber has its own electric metering unit that is connected to a distributor head, meaning that half-side shut-off is available as standard. Fertiliser is placed via the FerTeC twin HD fertiliser coulter.

The relationship between the placement depth of the fertiliser and the seed sowing depth is set only once. If the sowing depth is subsequently changed, the fertiliser placement depth is automatically adjusted in relation to the seeding depth.

Telescopic running gear
The Precea-TCC is offered with 12 or 16 rows for row widths of 70, 75 and 80 cm. A telescopic axle is available for the running gear of the Precea. During field operation, this allows the position of over-sized tyres to be adjusted so that the wheels run between the seed rows, preventing compaction directly beneath the seed rows. With the wheels fully retracted, the Precea-TCC can be conveniently transported by road with an overall width of 3 m.

As of autumn 2023, the programme will be rounded off with new models for those closer spaced row crops, such as beet, rape or soya beans, with row widths of 45 and 50 cm in 18 or 24 rows.

IDEAS FOR OUR FUTURE

- Accurate seed placement due to precise pressurised singling with short propulsion channel
- Simple and self-explanatory operation with the AMAZONE AmaTron 4 ISOBUS terminal
- Extremely easy adjustment of the PreTeC mulch sowing coulters, with all the required settings made without tools
- High acreage output thanks to the large hopper capacity and the Central Seed Supply seed delivery system
- CurveControl for even plant distribution, even when driving round bends, resulting in uniform ripening of the crops

FertiSpot for the Precea precision air seeder

Spot-accurate fertiliser application: now also synchronised between the seeds and for all Precea models

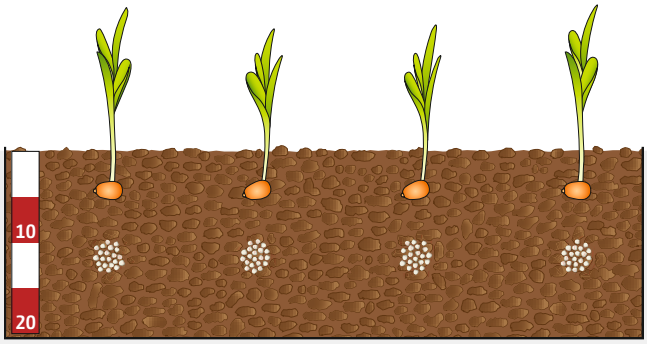
Precea 6000-2FCC with the FertiSpot metering unit for spot-accurate fertiliser application. The fertiliser is conveyed from the FTender 2200 front hopper via the transfer pipe to the rear of the machine where it is then portioned accordingly.

FertiSpot system overview - as a whole
① **Fertiliser hopper:** Supply of the under-root fertiliser
② **Metering unit:** Quantity of fertiliser metered
③ **Portioning unit:** Portioning of the fertiliser
④ **Fertiliser coulter:** Entry into the soil

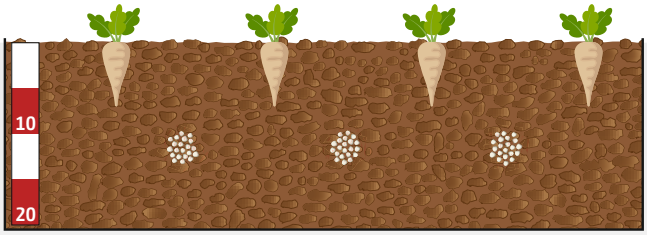
The FertiSpot system ensures spot-accurate application of the fertiliser under the seed. Owing to the legal requirements for a reduction in the permitted amount of fertiliser used, the challenge lies in using fertiliser more and more efficiently. This has compelled AMAZONE to further develop the FertiSpot system. AMAZONE will be showing FertiSpot at Agritechnica 2023 with the additional option of synchronised fertiliser placement between the seeds.

AMAZONE introduced the FertiSpot system in 2019 with placement of the fertiliser under the plant. The system uses the fertiliser as efficiently as possible, especially in maize sowing. As a result of the increase in the use of precision sowing for other crops, AMAZONE has further developed the FertiSpot system. The new development provides synchronised placement of the fertiliser portions between the seeds with the result that the system enables high concentrations of fertiliser while protecting sensitive crops from burning. In particular, this offers advantages in other crops such as sugar beet. Application between the seeds benefits all crops, especially in very dry soil conditions. If the fertiliser is placed too close to the seeds, it will deprive the plants of the necessary moisture, meaning that the seeds could dry out or have an insufficient supply of water.

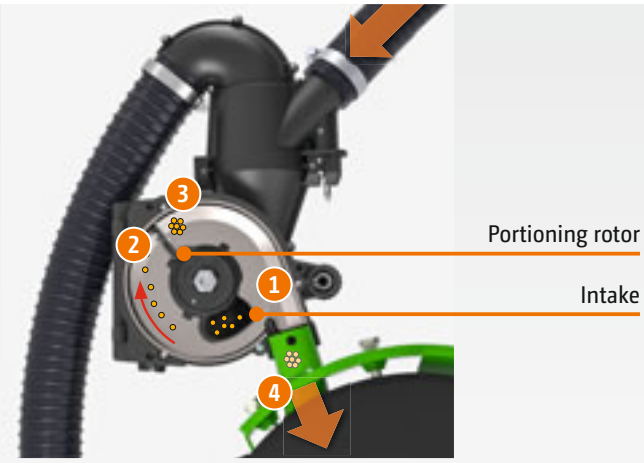
Structure of FertiSpot with granular fertiliser
The Precea precision air seeder with FertiSpot for granular fertiliser placement has a fertiliser hopper with fertiliser metering just like the traditional precision air seeder. The metering regulates the desired application rate per hectare. This can be varied using application maps. In conjunction with individual row shut-off, the fertiliser can be switched across for each row in wedge-shaped fields and tapering headlands via Section Control.



FertiSpot fertilisation under plants



FertiSpot fertilisation between plants



Structure of the FertiSpot portioning unit – in detail

① Fertiliser is continuously moved from the top to the portioning unit. The hose is connected to a standard metering unit.
② The portioning rotor rotates faster than the entering granules and is driven at an appropriate rotational speed in relation to the singling by an electric motor.
③ The granules are collected and compressed in one revolution of the portioning rotor. A consolidated portion is produced.
④ The granules leave the portioning unit in the direction of the coulter.

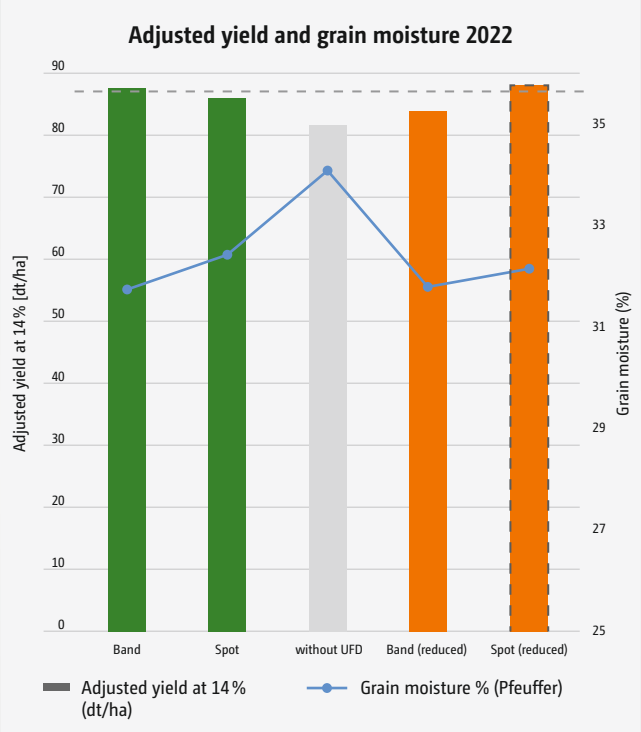
FertiSpot is fully integrated in the ISOBUS software of the Precea. Metering can be changed from spot fertilisation to band placement via AmaTron 4.

Video: FertiSpot in work
www.amazone.net/yt-fertispot

The mineral fertiliser is transferred from the fertiliser metering system to the FertiSpot fertiliser portioning unit. The fertiliser flow, which continuously enters the portioning unit, is combined by a high-speed portioning rotor. It leaves the unit as a portion and is delivered to the fertiliser coulter. The control of the portioning unit and delivery of the seed are synchronised. Control is provided via the Precea ISOBUS control system. The further development of FertiSpot means that the fertiliser can now be delivered both as a portion directly under the plant and as a portion between the seeds.

The tractor driver can enter the precise location of the spot via the ISOBUS control system. The fertiliser depot can be offset with the enhanced FertiSpot metering. The tractor driver can enter the precise location of the spot under the seed or as a possible offset between two seeds via the ISOBUS control system. Furthermore, band application is also possible with FertiSpot. The special design allows application rates of up to 250 kg of fertiliser per hectare depending on the machine specification and irrespective of the fertiliser type.

Spot-accurate fertiliser application 5 cm from and 5 cm below the maize seed. The fertiliser is only delivered where it is immediately available to the plant.



The diagram shows that spot application with a simultaneous 25% reduction in the use of under-root fertiliser can achieve the same yield level as conventional band application.

	Method	
	A (100 %, Band)	B (75 %, Spot)
Grain maize yield (dt/ha) at 14 %	88	88
Profit (€/ha) at 21 €/dt	**1,848**	**1,848**
Amount of fertiliser (kg/ha)	200	150
Fertiliser costs (€/ha) at 700 €/dt. DAP	140	105
Maize establishment costs (€/ha)	50	51.5
Total costs (€/ha)	**190**	**156.5**
Contribution margin (€/ha)	**1,658**	**1,691.5**

Comparison of the contribution margins between band application of the fertiliser at 100 % and spot application at 75 %.

Better utilisation of the fertiliser by the plant
Targeted placement of the fertiliser in the area of the seed leads to clearly improved nutrient utilisation, since the availability to the plant increases. The higher availability provided by spot application allows for a reduction in the total amount of fertiliser applied per hectare. Investigations carried out by the Technical University of Cologne predict fertiliser savings of 25 % with the same yield level.

In addition to the positive effects on environmental protection, there are further advantages for operational and work management. Direct cost savings from the reduced amounts of fertiliser required per hectare are accompanied by additional savings due to the higher work rates while sowing, since refill stops are reduced by 25 %. In regions with a large animal stock levels, mineral fertiliser can be saved and the farm manure can be put to more effective use.

The high saving in fertiliser not only provides considerable added value for the farmer, but contractors also save time and money, since they can increase output as a result of the reduced amount of downtime for fertiliser filling. The environment also benefits from the reduced and more efficient use of fertiliser.

The further development of the FertiSpot system enables it to be used in various crops. The variable application between the seeds means that the fertiliser can also be placed as a deposit for sensitive crops. Crops which are sensitive to fertiliser, such as rape or sugar beet, can therefore be optimally supplied with a reduced amount of fertiliser.

IDEAS FOR OUR FUTURE

- FertiSpot allows the amount of fertiliser to be significantly reduced and the environment is protected
- Benefits of the reduced amount of fertiliser:
  – Farmer: lower fertiliser costs
  – Contractor: higher output due to shorter turn-round times

Combined for high outputs!

FT-P 1502 self-contained front tank and Primera DMC universal seed drill

Combining the FT-P 1502 front tank and Primera DMC allows nutrient injection directly alongside the seed.

The FT-P 1502 front tank with a capacity of 1,500 l is a perfect choice for the application of liquid fertiliser into the seed furrow.

Interface between the FT-P 1502 front tank and the part-width valve chest on the Primera DMC.

The FT-P 1502 self-contained front tank is the ideal partner for any applications with liquid products. These include a seed drill with liquid fertiliser equipment, a hoe with a band sprayer and many others.

New areas of application for the Primera DMC in combination with the FT-P
The combination of the FT-P with the Primera DMC offers the farmer an even wider range of options for optimum nutrient supply and quick seedling development. Liquid fertilisers can now also be metered directly into the seed furrow by combining the FT-P with the Primera DMC. This improves nutrient availability, especially under dry conditions. Unlike granular fertiliser, it is already in dissolved form and does not have to be made available to the plants by the soil moisture. This aids nutrient efficiency and promotes a vigorous and fast growing crop. Bio-stimulants, micro-nutrients or other liquid products can also be applied directly into the seed furrow as an alternative.

ISOBUS control for the FT-P and the Primera DMC
The ISOBUS control of both machines makes handling extremely comfortable. The ISOBUS control system means that automatic part-width section control via Section Control and variable rate control via application maps are are extended in full to both machines.

Compact, effective and efficient
The complete implement combination is very compact in spite of the extra hopper because the FT-P is mounted on the front hydraulics of the tractor. The manoeuvrability of the complete implement combination is also not restricted.

The injection pipe on the coulter ensures precise placement of the liquid fertiliser in the seed furrow.

Only low rates have to be directly applied into the seed furrow owing to the high nutrient efficiency of the fertiliser application being directly alongside the seed. The 1,500 l tank capacities of the FT-P are therefore perfectly tailored to the large hopper capacity of the Primera DMC, thereby guaranteeing high performance in spite of the additional application.

Standard interface for the part-width valve chest
A part-width valve chest with 2 to 6 part-width sections can be fixed to any connected implement. Various AMAZONE and SCHMOTZER machines can also be equipped with a permanently mounted part-width valve chest with separable connection points on the valve chest. The valve always remains with the implement when the implement is changed. This means that any attached implements can be changed quickly and easily. The working spectrum of the FT-P 1502 front tank covers an application rate of 5 to 100 l/min at a working pressure of 2.0 to 8.0 bar.

The liquid fertiliser mounting kit in combination with the FT-P 1502 is available for the Primera DMC in all working widths from 3 m to 9 m.

IDEAS FOR OUR FUTURE

- Everything from a single source – FT-P 1502 and matching fertiliser equipment for the Primera DMC
- Additional options for combining the FT-P with all AMAZONE and SCHMOTZER machines
- Use of the FT-P for various machines throughout the year
- Efficient, environmentally-friendly nutrient injection directly alongside the seed

green orange

for Innovation 2024

Innovations in fertilisation

ZA-TS 5000 mounted spreader

More efficient than ever

5,000 l capacity and 4,500 kg payload guarantee maximum output from the ZA-TS 5000

Video: ZA-TS 5000 In work
www.amazone.net/yt-za-ts5000

The integration of the Profis weighing system enables the optimum loading. Intelligent solutions such as WindControl and ArgusTwin are also available

AMAZONE has extended its mounted spreader product range with the ZA-TS 5000. The ZA-TS product range has stood for maximum performance with the highest precision since its introduction. Precise spread patterns up to 54 m with application rates of 650 kg/min are the key to this. While capacities of up to 4,200 l were previously possible, the new hopper capacity of up to 5,000 l further increases the maximum area output.

Increased efficiency
The increase in capacity of 800 l reduces the number of filling operations, thereby simplifying the logistics. The large hopper capacity of the mounted spreader can be used to the full, especially when using lightweight spreading materials such as urea. The number of journeys between the field and yard can be reduced and the increasingly shorter time windows for the spreading are optimally utilised. Efficient, needs-based fertilisation is therefore guaranteed.

Use the full potential
The ZA-TS 5000 comes with the Ultra frame and the Profis weighing system as standard. The intelligent integration of the Profis weighing system in the ISOBUS software enables the user to monitor fill levels and residual volumes, define target weights and fill precisely at any time. The maximum payload of 4,500 kg is utilised in full without running the risk of overloading the spreader.

IDEAS FOR OUR FUTURE

- **Increased efficiency**
  Make the best use of fertilisation windows
- **Use the full potential**
  Fill precisely and avoid empty trips

The compact tractor mounting provides optimum weight distribution, even with heavy payloads

ZG-TX – the combi spreader without compromise

Flexible – Precise – High-performance

The new ZG-TX 11200 Super trailed combi spreader with maximum capacity for large working widths

Video: ZG-TX in work
www.amazone.net/yt-zg-tx

The AutoTS border spreading system, fitted to the right-hand side of the machine, generates the maximum yield up to the field boundary and sets new standards in the combi spreader sector.

AMAZONE sets new standards in the combi spreader sector with the new trailed ZG-TX. Both granular mineral fertilisers and earth-moist limes can be applied precisely through the one machine by means of a simple conversion between the TS spreading system and the newly developed spreading unit for lime. The ZG-TX therefore combines the advantages of the TS spreading system, with its disc-integrated AutoTS for optimum border spreading results, with maximum efficiency in spreading lime. With the simple Special frame and the stronger Super frame, AMAZONE offers the right machine for any application.

Precision spreader in its class – accurate fertilisation in focus

The term combi spreader is used to describe machines which meter either mineral fertilisers or lime to 2 spreading discs via a floor belt. However, the demand for optimum precision is also increasing in the customer sector for combi spreaders. Against this background, AMAZONE decided to break new ground in the field of fertiliser application and combine it with the precision of the TS spreading system. The result is new in many respects.

Instead of a simple chute via which the fertiliser is guided onto the disc, a defined delivery point adjustment is integrated into the ZG-TX. This in turn enables precision-optimised features such as HeadlandControl and Section Control to be achievable. As a result, the spreading unit, familiar from the TS spreaders, provides precise spread patterns up to a working width of 54 m. When combined with the optional FlowControl torque measuring system, an exact spread rate regulation is guaranteed right from the first second. In this respect, the fertiliser is precisely metered using the intelligent interaction betwen the electric double shutter and floor belt speed. This is also possible independently of which side when using application maps.

Perfect border spreading

The ZG-TX also sets new standards in border spreading. The AutoTS disc-integrated border spreading system is fitted during assembly to the right-hand side of the machines as part of the TS spreading system. This guarantees an optimum border spreading result right up to the edge of the field, even at large working widths. Previously a feature only found on the ZA-TS and ZG-TS precision spreaders, the system is now also used on the ZG-TX. As a result, up to 17 % additional yield is possible in comparison to conventional border spreading systems. The use of such a border spreading system in a combi spreader is unique.

The newly developed border spread deflector for lime allows precise work up to the field boundary.

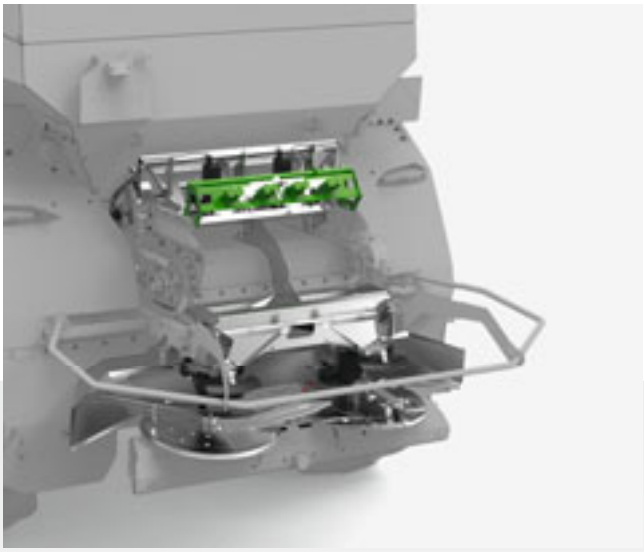
Double benefit –
lime and fertiliser distributed to perfection
The special feature in the ZG-TX is the simple conversion between lime and granular mineral fertilisers. Only a few individual components need to be exchanged for this purpose. These include the spreading discs, the splash guard and the delivery system. Thanks to the clever software, the terminal recognises that the spreader has been converted. The combi spreader is converted completely in around 25 minutes enabling either lime or fertiliser then to be spread.

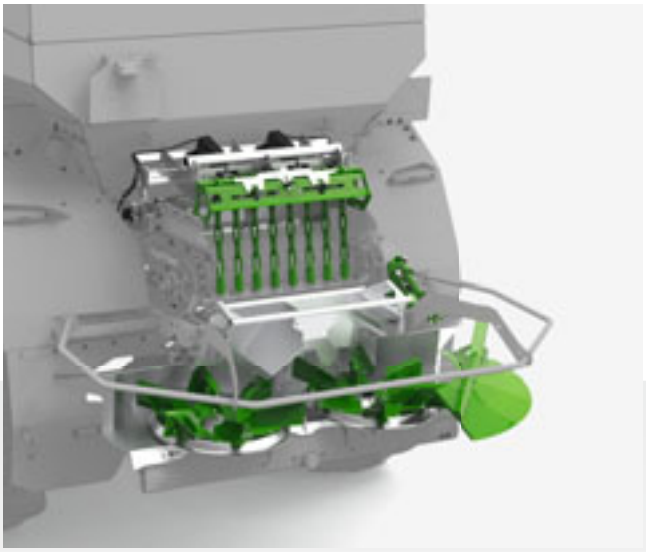
Highly efficient lime spreader with innovative features – no compromises during arduous field work
In particular, the robust design of the ZG-TX Super means the maximum load on a single axle. This is provided by the axle load of 15 t combined with a drawbar load of 6 t. The steep hopper walls ensure that even earth-moist limes flow smoothly, and an optional chain rake then guarantees the even flow of material to the spreading unit.

This newly-developed spreading unit ensures maximum work rates. It distributes the lime effectively at working widths of up to 16 m.

Lime spreading from a new perspective
In addition to its performance when undertaking arduous lime spreading, precision was also at the focus of the developments. For example, an optional rate reduction shutter also enables, at the same time, the even application of small quantities of lime of less than 1 t/ha. Furthermore, from the off, the spread pattern can also be optimised for lime by means of a simple delivery point correction.

Again as a new development for combi spreaders, AMAZONE now also offers a border spread deflector for lime application as an option. This means that lime can also be precisely applied too along field boundaries and ditches.





Only a few components have to be changed for conversion from fertiliser use **(left)** to high-output lime use **(right)**.

The interaction between the floor belt and the double shutter enables precise metering irrespective of the side.
The PTO-driven TS spreading system guarantees precise spread patterns at working widths of up to 54 m.

The right machine for any application
The various levels of equipment available for the ZG-TX trailed combi spreader means that the machine can be specifically tailored to each respective application on large-scale farms, contractors or in machine hire businesses. The Special frame variant comes with a hopper capacity of 6,800 l and 9,000 l with a maximum permissible machine weight of 12.5 t. The Super frame variant has a capacity up to 11,200 l and a weight of 21 t.

Whereas the ZG-TX Super is equipped with a rigid bottom hitch drawbar as standard, the ZG-TX Special can also be supplied either with a top or lower mounted drawbar.

AS profile tyres up to 2.05 m diameter or 750 mm wide implement wheels evenly distribute the weight on the ground. The optional axle steering with a steering angle up to 20 degrees completes the product line-up. The dual-circuit pneumatic braking system and the LED lights installed as standard ensure safe, high-speed road transport of up to 40 km/h.

The floor belt rises by 5 degrees which enables a transfer from the rear to the front. This guarantees optimum load distribution during spreading. Maximum drawbar load and reduced axle loads enable safe driving in the field.

ZG-TX 6800 Special

ZG-TX 11200 Super

Easy operation with the machine-specific EasySet 2 in-cab terminal

Intuitive operation with new ISOBUS software

Comfortable operation with Easy and ISOBUS
The right control system is available for every application with the two operating concepts Easy and Tronic. The new intuitive ISOBUS control provides all the functions of the ISOBUS world in the ZG-TX Tronic. In addition to Section Control, part-area, site-specific application and job management, the control system can be integrated in the operating system of the tractor with AUX-N. With up to 3 cameras, you have the surroundings and the machine in view at all times. The optional lighting kit is also integrated in the software in the ZG-TX. Flashing indicates the hopper fill level and permits optimum loading using the intelligent interaction with the digital fill level indicator. There is nothing left to be desired here.

Operation with the machine-specific EasySet 2 in-cab terminal, which is also used in the ZA-X, ZA-M and ZA-V mounted spreaders, guarantees easy operation with any tractor. The focus here is on the simple forward speed related rate regulation. A wide variety of tractors can therefore be used with ease with a minimum of demand on the tractor.

Uniform crops on the headland
In the ISOBUS-control models, HeadlandControl is responsible for perfect distribution on the headland. In combination with the electric delivery point adjustment, 16 part-width sections are switched following the parabolic shape of the spread fan. Furthermore, the headland is pushed further into the field, meaning, therefore, that Section Control is also possible at the optimum switching points, even with a trailed spreader, without having to cross the headland tramline. The interaction between the components of the TS spreading system makes the ZG-TX a genuine precision spreader in its class.

IDEAS FOR OUR FUTURE

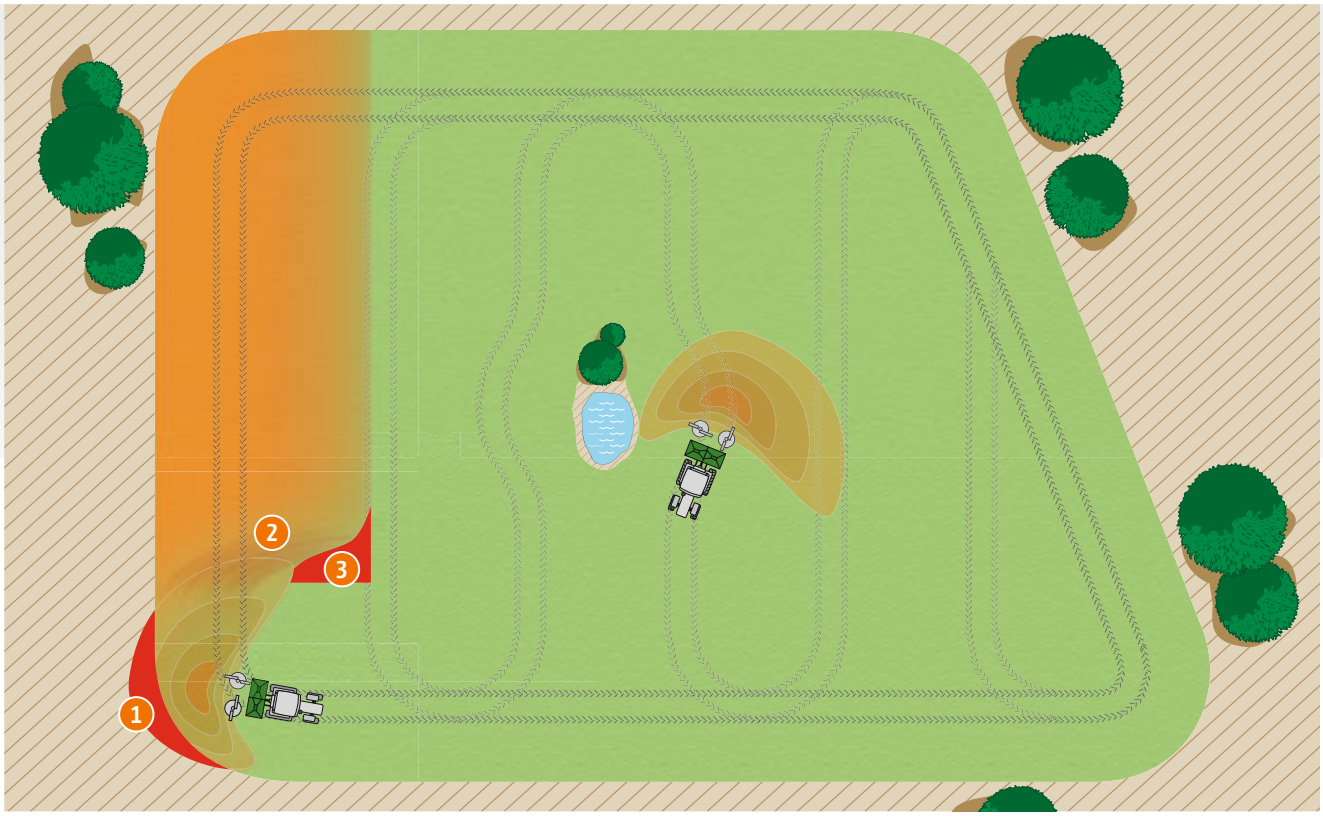
- **Flexible areas of application**
  Quicker and easier conversion between lime and fertiliser spreading
- **First-rate spread patterns**
  Precise lateral distribution for fertiliser and lime thanks to the tried-and-tested TS spreading system
- **Perfect border spreading**
  Up to 17 % additional yield at the edge of the field with the AutoTS border spreading system – proven by field trials at the Wieselburg Innovation Farm
- **Maximum performance**
  Up to 54 m working width, 11,200 l capacity and 17 t load

ZG-TX 11200 Super: Powerful use of lime with 17 t payload, and up to 16 m working width

CurveControl for AMAZONE centrifugal broadcasters

Precise fertiliser application even around curves

Every field has borders and curves



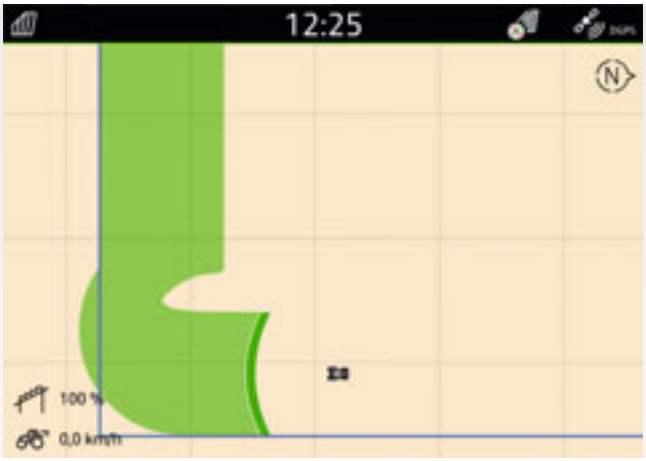
Effect on fertiliser distribution when negotiating bends
① Incorrect application beyond the field boundary
② Over-fertilisation as a result of multiple overlaps
③ Under-fertilisation caused by the move in the spread pattern

CurveControl adjusts the lateral distribution to the various cornering speeds and corrects the movement of the spread pattern in centrifugal fertiliser broadcasters when driving around bends. This results in more uniformcrops and helps prevent of undesired over-fertilisation inside the bend as well as fertiliser placement beyond the field boundary.

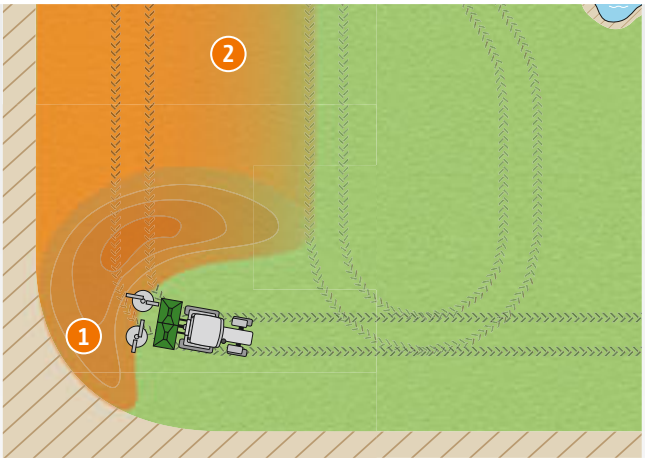
The challenge: complex causal relationships
Curve compensation has already been implemented by AMAZONE in crop protection sprayers. However, the sprayer boom is located tight behind the physical pivot point of the machine. The application rate only has to be adjusted within the boom width for curve compensation.

The throwing distance of a centrifugal broadcaster is up to twice the working width and the application area is many metres behind the spreader depending on the type of fertiliser. Furthermore, the spread fan is kidney-shaped.

All this demands detailed knowledge of the way that the spreading unit works with the various fertilisers along with a corresponding complex implementation of a control algorithm. CurveControl therefore requires an exceptionally high degree of innovation and complexity for a fertiliser spreader.



GPS view of a curve without CurveControl. The spread fan is located many metres behind the tractor and undesired swivel movements occur.



Perfect fertiliser distribution through CurveControl
① No incorrect application beyond the field boundary
② Even fertiliser distribution in all field areas

Consequence: incorrect application caused by the turn
The current state of the art of modern centrifugal broadcasters has the disadvantage that over- and under-fertilised areas inside of the working width occur when negotiating bends as a result of different speeds. This effect is amplified by the combination of forward speed and swivelling of the spread pattern caused by the steering angle. This means that significant over-fertilisation arises in some areas as a result of these multiple overlaps, whereas gaps occur in other areas.

In addition to this, the swivelling of the spread fan at the edge of the field causes fertiliser to be applied beyond the field boundary. This must be avoided without fail with regard to resource conservation and to abide to the applicable regulations.

Perfect fertiliser distribution around curves
CurveControl prevents under- and over-fertilisation, which is undesirable from an ecological and economic point of view, and thereby minimises the risk of nutrients leaching into the ground water. Furthermore, incorrect application beyond the field boundary when negotiating bends is prevented by CurveControl. In addition to this, CurveControl can further improve the environmentally-friendly use of mineral fertiliser in combination with existing solutions such as ArgusTwin, WindControl and GPS part-width section control.

In summary, CurveControl closes an important, frequently underestimated gap and provides even distribution in all areas of the field. It will not only make a key contribution to environmental protection but will also improve the cost benefit result for every application.

IDEAS FOR OUR FUTURE

- **Environmentally-friendly**
  No incorrect application when negotiating bends
- **Resource-conserving**
  Optimum use of the available fertiliser
- **Economic**
  Uniform crops in every field situation

for Innovation 2024

Innovations in plant protection

SCHMOTZER hoes

Precision mechanical weed control for every farm

SCHMOTZER offers the right hoe for every crop as a result of the extensive selection of different parallelograms and tools.

The centre of gravity of the hoe is positioned very close to the tractor as a result of the extremely low depth of the shift frame.

VR 2 linear shift frame

SCHMOTZER offers a new shift frame for its hoes. The VR 2 linear shift frame catches the eye as a result of its extremely compact design, and its strength impresses, especially when hoeing under the most difficult of conditions.

The new linear shift frame sets itself apart on account of its very high total travel range of 600 mm (300 mm left and 300 mm right). Optimum guidance of the hoe through row crops without them being damaged or hoed out is therefore guaranteed, especially on non-straight headlands and fields with slopes, where the tractor tends to drift.

A unique feature of the new VR 2 shift frame is its extremely compact design. The distance from the lower link coupling point of the tractor to the coupling point on the hoe is only 470 mm. The VR 2 is therefore 450 mm shorter compared with our well-known AV 5 parallel shift frame, and it is also the most compact shift frame in this class on the market. The extremely compact design significantly reduces the distance of the centre of gravity of the hoe to the coupling point on the tractor and therefore also the leverage effect of the machine on the tractor. This results in several positive effects. On the one hand, the tractor requires considerably less lifting power. On the other hand, the amount of front ballasting is significantly reduced as a result of the lower centre of gravity distance. This a real advantage for soil protection and when carrying out work in hilly terrain. Furthermore, the lower centre of gravity distance also provides a smoother ride on the road.

A choice of support wheels of either 195/55 R10 or 225/55 R12 are available for the shift frame to ensure maximum smooth running and the best possible contour following of the hoe. The support wheels can be steplessly adjusted to track widths from 1.50 m to 2.25 m for individual use in a variety of crop row widths. Even track widths up to 3 m are possible with an optional extension kit, meaning that the VR 2 shift frame is also ideal for working on beds. A stabilisation disc can also be fitted to the VR 2, so that the shift frame runs smoothly on slopes and the lateral forces transferred to the tractor are minimised. Lateral forces arising from the shift frame are transferred to the ground via the stabilisation disc and the tractor remains reliably on track.

The integrated central oil circuit is a key element of the new VR 2 shift frame. The hydraulic functions of the camera control and the Section Control of the parallelograms are thereby supplied with the requisite quantity of oil. As a consequence, these fully equipped hoes make significantly lower demands on the oil flow, oil quantity and oil supply from the tractor.

The hoe is safely steered between the rows when negotiating bends and on the slope thanks to the extremely large shift travel of 600 mm.

The Smart Vision camera can detect crop plants from a size of 2 x 2 cm.

Furthermore, all hydraulic and electronic components are installed and laid out behind guards for the best possible protection. All the lubrication points of the shift mechanism on the VR 2 are centrally combined, meaning that maintenance can be completed in a very short time.

Smart Vision camera system
The vast majority of the hoes supplied today are equipped with automatic row crop control via a shift frame and a camera system. In this respect, the camera system is the heart of the control system and must guide the hoe perfectly through the crop rows by means of reliable plant detection. SCHMOTZER has developed the Smart Vision camera system for this essential task.

The camera eye of Smart Vision generates a high-contrast image with full HD resolution. This ensures that crop rows are detected from a plant size of 2 x 2 cm. The camera is absolutely dustproof and even resistant to high-pressure washers thus guaranteeing a long service life.

The camera is equipped with a multi-row detection system for up to 5 rows, so that hoeing can also be carried out at the earliest possible stage in the plant development - even in crops with gaps.

Furthermore, the camera can be provided with an LED work light, so that hoeing at night is not a problem. This is an attractive option, especially in combination with the RowSpray band sprayer. In addition, a row sensor is available for the camera system as an option. This allows effective and precise hoeing at or just before canopy closure and is ideal for stem-forming crops, such as maize or sunflowers.

The camera system is equipped with a tilt sensor with automatic slope correction, so that the hoe is safely guided through the crop rows via camera control and the shift frame, even on slopes. This means that hoeing is not only possible on level ground but also on challenging terrain. In this respect, the camera adjustment makes the same demands on the driver as on level ground, meaning that drivers with less experience can also carry out hoeing on a slope without any problems.

After all, the Smart Vision camera system controls the shift frame with utmost sensitivity via a pulse-width modulated control system. The shifting speed of the frame is regulated depending on the forward speed. The speed is measured via a wheel sensor on the support wheel of the shift frame.

The camera system is operated via a high-resolution 10" terminal.

RapidoClip quick-change hoe blade system in work.

The camera system is comfortably monitored in the cab via a high-resolution 10" terminal with touch control. This is dustproof and splashproof for maximum resistance to external influences.

RapidoClip quick-change system for hoe blades
A long service life combined with a sharp edge is essential for hoe blades. This should result in the hoe blades producing a full-width movement of the top 2 to 3 cm of the soil. If the blades are worn, their replacement should be simple and quick to change thus keeping the downtime of the hoe as short as possible. Downtimes of the hoe as a result of repairs to wearing parts should be minimised, especially in wet years with short work windows for hoeing. Hoe blades with different widths may also be required between the various crops.

The hoe blades are normally either bolted, riveted or welded to the blade shaft, depending on the manufacturer. These systems have disadvantages, however, with regard to the time required for changing, secure mounting for the hoe blades and the costs involved. For this reason, two quick-change systems for hoe blades have already established themselves on the market. In these systems, the hoe blade is hooked into the shaft and then secured either with a bolt or with a locking split-pin. However, even these variants have the problem that the coulters become loose and that the replacement requires more time and effort as a result of the wear on the locking system.

The RapidoClip quick-change system was developed to resolve the problems associated with the various hoe blade fixings. The system has been registered for patent and is the first completely tool-free quick-change system for hoe blades on the market. RapidoClip permits an easy and, above all, rapid change of the hoe blades.

As in the case of the familiar Rapido blades from SCHMOTZER, the new RapidoClip consists of a blade shaft and a blade plate which are joined together via a tongue and groove system. In the new RapidoClip system, the share plate is secured to the blade shaft via the RapidoClip spring lever. The spring lever clamps the blade plate securely on the blade shaft via the over-centre lever and the pivot point milled in the blade shaft. This system holds the hoe blade securely on the share shaft, even under the hardest soil conditions.

To change a hoe blade, the spring lever is pressed on the share shaft with one hand. The spring-lever locking device

RapidoClip is the first tool-free quick-change system for hoe blades.

The hoe blades are held securely on the share shaft even under the hardest conditions via the leverage effect of the spring lever.

on the share shaft is slackened in the process and can be pulled out to the side with the other hand. The spring lever can then be folded downwards and removed from the slotted hole of the blade plate. The blade plate is then subsequently pushed forwards out of the tongue and groove system and a new blade plate pushed on the share shaft. Afterwards, the blade plate is clamped on the share shaft with the spring lever. The share can be changed on the hoe without tools in next to no time with RapidoClip, even in the field, and therefore represents real added value for the hoe.

Furthermore, the shallow ridgers have also been redesigned for the RapidoClip system and can continue to be mounted on the share shaft. The shallow ridgers are fixed to the share shaft with a screw clamp and the ridge intensity can be adjusted or disabled via a slotted hole.

RapidoClip with released spring lever

Removal of the blade plate

SCHMOTZER Venterra 2K hoe in combination with the AMAZONE FTender 1600 mounted front hopper for weed control and fertilisation in one pass.

Pantera 7004 self-propelled sprayer

Maximum performance and flexibility with the new self-propelled sprayer from AMAZONE

Pantera 7004 with 36 m Super-L3 boom

Video: Pantera 7004 in work
www.amazone.net/yt-pantera7004

7,000 l tank capacity yet still a compact design

With the Pantera 7004, AMAZONE is offering a further model in the self-propelled sprayer segment. The outstanding features of this new machine are its high tank capacity and the newly developed running gear. The Pantera 7004 combines high performance with first-rate driving characteristics and is ideal for large-scale farms and contractors who place the highest demands on efficiency and comfort.

7,000 l tank capacity

With a maximum spray tank capacity of 7,000 l and a nominal volume of 6,600 l, the Pantera is designed for enormous work rates. The tank is made of glass-fibre reinforced plastic and has exceptionally smooth inner and outer walls with no nooks and crannies, which allows perfect cleaning. The layout of the four high-pressure cleaning nozzles, agitation and outlet sump is based on the tried-and-tested concept of the existing Pantera models and guarantees optimum cleaning with minimal residual volumes. A 500 l tank provides fresh water for cleaning. This is positioned at the rear of the machine ensuring that it has a low centre of gravity, even with an empty spray tank.

The high-capacity lightweight

The machine is lightweight in its performance class with an empty weight of just approximately 12 t. Large wheels with an outer diameter of up to 2.05 m can be configured for maximum soil protection and clearance. Furthermore, an optimum weight distribution and automatic traction control on each wheel guarantee the best possible traction in any situation.

The drive is perfectly tailored to the operating conditions with an engine power of 306 hp (225 kW), which is hydraulically transferred to the wheels. The Pantera can therefore work under any conditions and is also extremely economical.

Wheels up to 2.05 m high

Chassis versions with hydraulic track width adjustment

Pantera 7004

Running gear with independent wheel suspension and slope compensation

The new running gear with independent trailing arm suspension is of a unique design. The hydro-pneumatic suspension is adaptive, whereby the characteristics of the running gear are tailored to the driving situation. This intelligent control provides the best driving stability and maximum driving comfort combined with a simple and weight-reduced design in comparison with a conventional independent suspension. In addition, the system prevents any rocking when the tank is not completely full and enables high driving speeds, even on poor quality roads. Hydraulic track width adjustment, with a standard track width from 2.00 m to 2.75 m, is fitted as standard. The Pantera-W, with track widths from 2.25 m to 3.00 m, is also available. The ground clearance in both machines is approximately 1.30 m, which means that tall crops can be driven through without damage.

Another plus point is the soil-conserving function of the offset track driving, in which, for example, the front wheels can be set at the minimum track width and the rear wheels at maximum, meaning the soil is travelled over just once. As a result, especially in unfavourable soil conditions, the soil is not smeared as much and young plants suffer hardly any damage. In contrast to dog-leg steering, the machine is always aligned to the direction of travel.

The integrated slope compensation is another highlight. The inclination of the vehicle is detected via sensors and the machine is automatically kept horizontal up to a certain gradient. This feature, in combination with the low centre of gravity of the machine and the hydro-pneumatic running gear, provides extremely high slope stability. In addition to

Offset track driving protects plants and soil

Active slope compensation for more comfort and safety

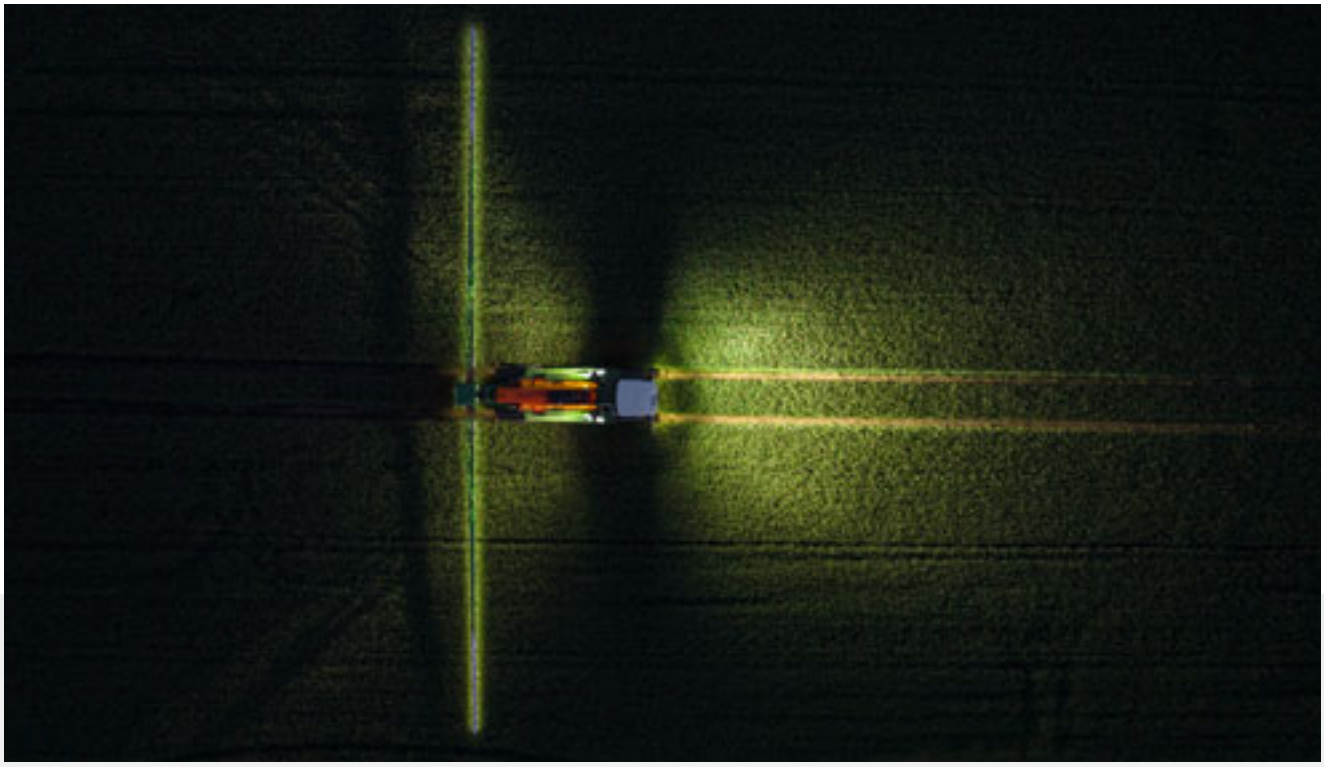
Modern cab with 12 LED work lights at the front

Clearly laid-out armrest with ergonomic operation

the enhanced driving comfort, this enables the driver to work extremely safely, even in very hilly terrain.

New comfort cab
The new cab offers a modern work place with excellent all-round visibility. In 3 equipment levels, the operator is left with nothing to be desired in terms of comfort. The cab is equipped with filtration which meets the Cat. 4 standard offering the highest possible safety in the work place. The new armrest is characterised by an extremely clear and ergonomic design. It is tailored specifically to the functionality of a self-propelled sprayer, and all the important functions are always within reach. As part of the twin terminal strategy, the 7" AmaDrive terminal is responsible for the operation of the base vehicle, whereas the spraying system is operated via an ISOBUS terminal. All the important spraying functions can also be freely assigned to the buttons of the ISOBUS-compatible drive lever.

12 LED work lights are now incorporated in the cab roof as standard. Night turns to day in conjunction with the LED work lights at the rear of the machine and the option of individual nozzle lighting on the boom.



Pantera 7004 with LED work lights and individual nozzle lighting as standard

Easily accessible pumps and additional storage compartment

High-output crop protection technology
The piston diaphragm pumps are designed for a constant total output of 610 l/min for maximum work rates. The injection principle provides a suction capacity of approximately 700 l/min for filling. A bowser fill port is available as an option. This allows a filling speed of up to 1,000 l/min with the 3" line, which results in minimal downtimes.

The SmartCenter is available in the two established variants “Comfort-Pack” and “Comfort-Pack plus” and is sure to impress with outstanding operational comfort and exceptional performance levels for the induction of plant protection agents.

The precision boom technology from AMAZONE with the unique aircraft wing design enables working widths from 24 m to 48 m with many reduction options and a very low weight. This means that the Pantera 7004 is not only ideally suited for large-scale farms but also for flexible use by contractors. Furthermore, high working speeds are possible without having to make any compromise in the application quality thanks to the exceptionally quick and precise “ContourControl” active boom guidance.

DirectInject direct feed system
The DLG award-winning DirectInject system is available as an option. This enables additional products to be added as and when required in a matter of seconds, which makes the use of the self-propelled sprayer even more flexible and more efficient. The system is fully integrated in the liquid circuit and the operating system of the Pantera, meaning that all the functions – from activation to cleaning – can be started from the cab at the touch of a button.

Illuminated storage compartment under the cab with bowser fill port and automatic fill stop

IDEAS FOR OUR FUTURE

- **Efficient:** High tank capacity of 7,000 l and wide boom widths up to 48 m with working speeds up to 30 km/h
- **Soil-conserving:** Lightweight design and large tyre sizes with optimum weight distribution
- **Comfortable:** Ultra-modern chassis and cab technology as well as user-friendly operation
- **Flexible:** Hydraulic track width adjustment and a wide variety of booms for many different areas of application
- **Safe on the road and in the field:** Low centre of gravity and stable running gear with automatic slope compensation

Optimum monitoring of the nozzle function via the individual nozzle lighting

DirectInject for the Pantera self-propelled crop protection sprayer

Needs-based metered addition of products at the touch of a button

DirectInject on the Pantera 4504 between the cab and spray agent tank

Fully integrated operation of the direct feed system via the ISOBUS terminal

Injection points of the 2 spray lines into the liquid circuit

The Pantera 4504 and 7004 are now available with the DirectInject direct feed system, in order to supply individual products flexibly, quickly and matched to requirements.

In times of growing challenges for plant protection with respect to a reduction in the use of pesticides and increasing application requirements combined with time and cost pressure within the farm, DirectInject offers an excellent way of simplifying current and future demands.

An additional product can be added to the spray agent circuit during application at the touch of a button. The highlight of DirectInject is the short reaction distance from the activation to the application of the additional product of only approx. 30 – 50 m. The respective mixture is conveyed to the nozzle bodies through 2 separate spray lines for the spray agent and the spray agent + DirectInject component via several injection points in the boom. In this respect, the two spray lines are alternately switched via valves, with the result that only one line is actively conveying spray agent at any time.

This short reaction distance is indispensable, especially for the flexible treatment of weed patches. Furthermore, the system facilitates flexible plant protection measures in many everyday situations, e.g. the separate treatment around field boundaries, the metered addition of products on individual fields with special requirements as well as the variable application rate of a product, irrespective of the application rate of the main mixture.

Effective cleaning can be carried out from the cab without any problems thanks to the complete integration of the system into the liquid circuit and machine operation.

In particular, the self-propelled sprayer, which is often used by large-scale farms as well as contractors owing to its high ground clearance and the hydraulic track width adjustment, gains an enormous additional increase in flexibility and efficiency with DirectInject.

IDEAS FOR OUR FUTURE

- Flexible, fast and needs-based use of plant protection agents
- Saving of:
  - Working time and labour costs
  - Machine costs
  - Plant protection agents
- Environmentally-friendly
- Self-propelled sprayer and direct feed system as a perfect combination for maximum efficiency and flexibility

New Super-L3 boom now in up to 48 m working width

Maximum precision as a result of new swing compensation system through ContourControl and SwingStop Plus

48 m wide Super-L3 boom – optimum application results without drift thanks to the precise and tight boom guidance over the crop

48 m wide Super-L3 boom – outer boom section of aluminium and penultimate boom section of carbon fibre

Maximum working width with the best boom ride
AMAZONE developed the Super-L3 booms for the most extreme conditions and an absolutely smooth boom ride. The product range previously covered booms in working widths of 36 - 42 m. However, now the 30 m, 33 m, 45 m and 48 m wide versions have been added. The 45 m and 48 m versions also feature a swing compensation system which has been developed from scratch. This will be implemented in all Super L3 booms as standard from a working width of 39 m.

Large working widths with maximum stability and a low weight
The special AMAZONE profile design of the boom provides maximum stability with a low weight. The inner boom sections of the Super-L3 boom are made of steel. The outer boom sections consist of aluminium to keep the total weight down to a minimum.

The advantage of the light-weight outer boom sections is that only a little amount of extra weight has to be guided smoothly over the crop on the outside. Smooth boom guidance at the boom ends is extremely important, especially in the case of large working widths. The profiles of the penultimate boom section of the 48 m wide Super-L3 boom are made of carbon fibre for maximum stability with a low weight.

New swing compensation system
The swing compensation system is located in the middle of the boom and joins the parallelogram to the left-hand and right-hand booms. The swing compensation system has a very robust design, in order to meet the increased demands for high work rates at increased working speeds.

The new swing compensation system is equipped with the ContourControl active boom guidance system and the SwingStop plus active vibration damping as standard.

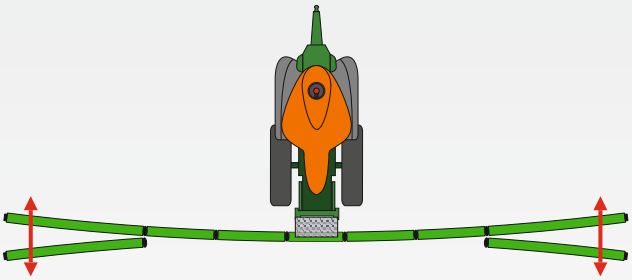
New swing compensation system for Super-L3 booms from 39 m

ContourControl – reduces those vertical boom movements
AMAZONE offers fully automatic boom guidance with the ContourControl active boom guidance system. This meets the increasing demand for higher precision during application owing to the minimal deviations in the distance from the target surface, even at high forward speeds and large working widths. For Super-L3 booms from 39 m, the ContourControl active boom guidance, in conjunction with the new swing compensation system, always includes Flex-fold 2. The basis of the boom guidance system is a highly responsive hydraulic system with 6 sensors which enable both automatic positive and negative angling.

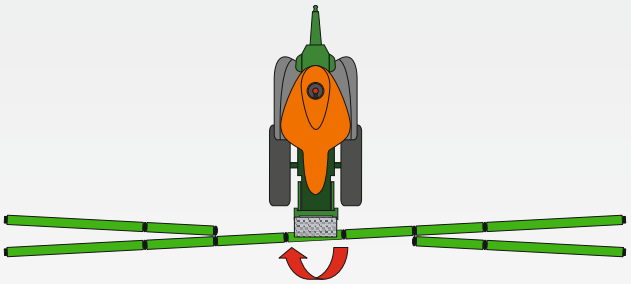
The benefits of ContourControl:
- Optimum lateral distribution
- Precise, super-fast automatic height guidance
- Target surface distance below 50 cm – less drift
- Very quick folding in and out
- Maximum precision at high working speeds
- Elegant boom control for those wider working widths

48 m wide Super-L3 boom – compact dimensions when folded for transport

Symmetrical oscillation
mainly during field work



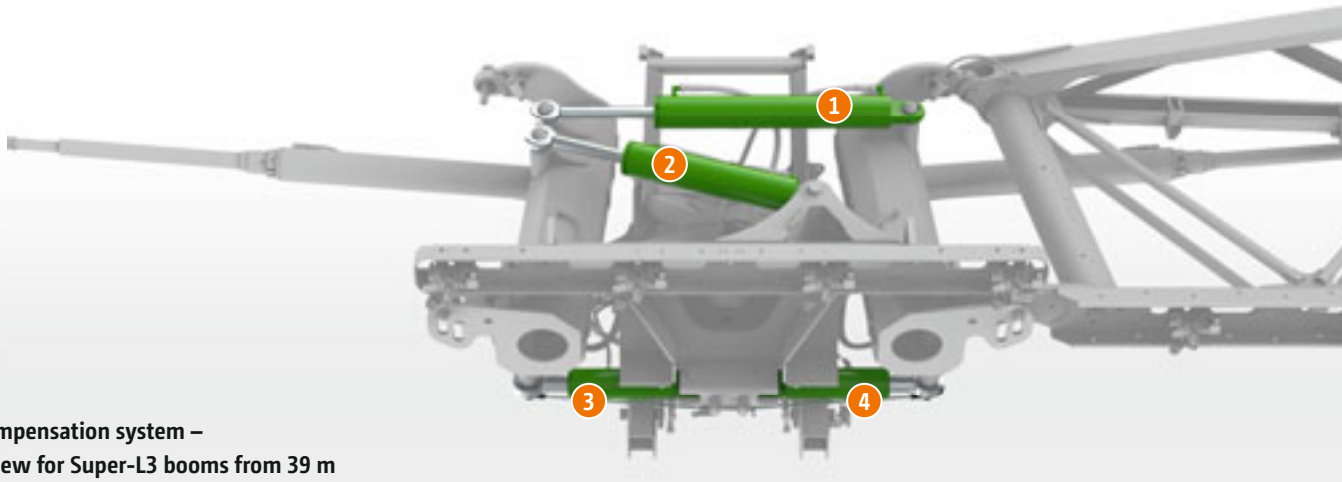
Asymmetrical oscillation
mainly in and after bends



SwingStop plus – the new active swing compensation system for reducing symmetrical and asymmetrical horizontal boom oscillations
The new swing compensation system for Super-L3 booms from 39 m includes SwingStop plus active vibration damping in order to tailor the horizontal boom ride to the increasing demands, such as larger working widths and higher forward speeds. External influences, such as ground undulations, driving round bends, acceleration and increasing working speeds – especially in the case of large working widths place enormous loads on the boom in the horizontal plane. This may result in the boom ends swinging back and forth, thereby negatively affecting the lateral distribution at the outer ends of the booms.

As horizontal movement occurs more at the boom ends, this effect is increased enormously by wider boom widths. To reduce this horizontal tip swing effect, SwingStop plus measures the resulting acceleration at the boom ends via acceleration sensors. The two hydraulic rams in the swing compensation system actively compensate for these swing movements and thereby provide a very smooth horizontal boom ride. Each individual boom is controlled separately by SwingStop plus.

SwingStop plus can compensate for symmetrical oscillations which occur through acceleration and braking extremely effectively. The new design of the swing compensation system now permits the individual control of both boom.



Swing compensation system –
bottom view for Super-L3 booms from 39 m

① **Positive angling cylinder:** Positive and negative angling of the right-hand boom section
② **Tilt cylinder:** Tilt adjustment of the entire boom in conjunction with the positive angling cylinder ① Positive and negative angling of the left-hand boom section
③ **SwingStop plus cylinder, left:** active swing compensation of the left-hand boom section
④ **SwingStop plus cylinder, right:** active swing compensation of the right-hand boom section

48 m wide Super-L3 boom in potatoes

In SwingStop plus, each boom section is equipped with a hydraulic cylinder which actively counteracts any oscillations which occur in that boom half. This means that even asymmetrical boom oscillations which occur after negotiating bends are effectively reduced.

The benefits of SwingStop plus:
- Optimum longitudinal distribution
- Reduction of horizontal boom movement for a smooth boom ride
- A system which operates very quickly and precisely, even at high working speeds
- Highest performance and outstanding precision
- Active reduction of symmetrical and asymmetrical oscillations

The interaction of ContourControl and SwingStop plus provides a very smooth boom ride at maximum working widths. This guarantees top-class application results with maximum area coverage.

AmaSwitch or AmaSelect individual nozzle control
The Super-L3 booms, from 39 m, are equipped with the manually-selected AmaSwitch individual nozzle control or the AmaSelect electric single nozzle control (incl. LED individual nozzle lighting) and DUS pro high-pressure recirculation system as standard. 25 cm nozzle spacing is available for both nozzle control systems as an option.

IDEAS FOR OUR FUTURE

- Super-stable yet light-weight booms in a compact profile design
- High area coverage with maximum precision thanks to ContourControl and SwingStop plus
- AmaSwitch or AmaSelect precise individual nozzle control from choice
- Optimum application results

Overview of Super-L3 booms

30/24/12 m

33/24/12 m

36/24/12 m

39/33/24/12 m

40/33/24/12 m

42/33/24/12 m

45/35/24/12 m

48/36/24/12 m

Hydraulic pump drive for the UF 1602 and UF 2002 mounted sprayers

Maximum comfort for mounted sprayers

More fuel-efficient use of a UF 2002 with hydraulic pump drive in hilly terrain

Hydraulic pump drive for the 300 l/min pump on the UF 02

AMAZONE offers a hydraulic pump drive for the UF 1602 and UF 2002 mounted sprayer. This is completely integrated in the hydraulic system in conjunction with the Comfort-Pack.

The hydraulic pump drive, which replaces the drive shaft, makes the attachment to various tractors exceptionally easy and requires no maintenance.

Operation and regulation
The hydraulic pump drive is regulated via the Load-Sensing system of the crop protection sprayer. Operation is provided completely via the ISOBUS software of the UF 02. Different pump speeds can be stored for filling, agitating and spraying. When one of these above functions is selected, the pump automatically adjusts the pump speed and keeps the speed constant regardless of the tractor engine speed. Speeds above the maximum pump speed of 540 rpm are safely prevented.

IDEAS FOR OUR FUTURE

- Pump drive independent of the tractor
- Protection of the pump due to no excessive speeds
- Easy coupling to and uncoupling from the tractor
- Fuel-efficient
- Maintenance-free

The oil requirement for the hydraulic pump drive is up to 50 l/min.

Filling
At the start of the filling process, the pump can be started comfortably from the TwinTerminal 3.0 in the SmartCenter of the UF. The pump is started nice and gently. The pump speed is regulated completely automatically and quickly reaches the pre-set speed. The engine speed of the tractor is irrelevant here. The maximum suction capacity can be used in full at all times without any concerns, since the control system automatically reduces any speeds above 540 rpm. As an option, the pump can be automatically switched off via the software after the nominal fill level has been reached.

Application in the field
When applying plant protection agents in hilly terrain, the pump speed of the sprayer is always kept constant within the permissible range e.g. when going uphill with a high tractor engine speed and driving downhill at a lower, more fuel-efficient speed. This guarantees optimum application results, reduces the fuel consumption and protects the pump from any overloading generated by excessive speeds.

ContourControl boom guidance for UF 02 mounted sprayers

Maximum precision and output for mounted sprayers

The UF 2002 mounted sprayer with ContourControl for fully automatic boom guidance

Fully automatic, active boom guidance via ContourControl

As an alternative to DistanceControl automatic boom guidance, AMAZONE now also offers the automatic active boom guidance system, ContourControl, for the UF 1602 and 2002 on boom widths from 27 m.

The ContourControl active boom guidance guarantees precise application at high forward speeds for maximum work rates and yet exact, close distances to the target surface and so resulting in less drift. This is an important component in precise, efficient and environmentally-friendly crop protection, even on small to medium-sized farms.

ContourControl
The AMAZONE ContourControl active boom guidance is a ground-breaking fully automatic hydraulic boom guidance system which now can also be used on mounted sprayers. The boom tilt is controlled by a hydraulic cylinder which is pre-pressurised on both sides. Rapidly switching hydraulic valves bring the boom to the desired position.

This actively reduces any of the various effects caused by uneven ground and other influences while driving. The cylinders for positive and negative angling of the two outer ends of the boom are controlled using the same principle. This allows the boom to follow highly uneven topography to maintain an optimal distance to the target surface across the entire working width, even on extremely hilly terrain.

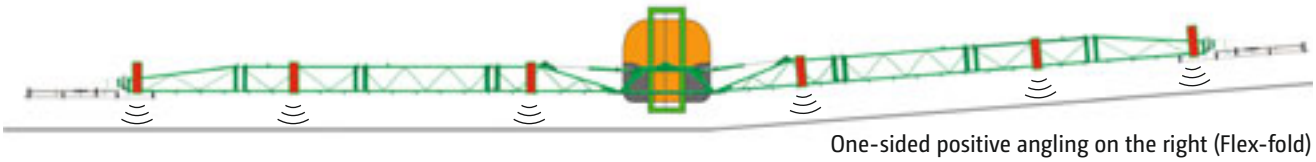
Less than 50 cm distance to the target surface with 25 cm nozzle spacing
Distances of less than 50 cm to the target surface can also be precisely maintained using the AmaSwitch quad nozzle body with a 25 cm nozzle spacing.

AmaSwitch with quad nozzle body and off-set kit for a perfect 25 cm nozzle spacing

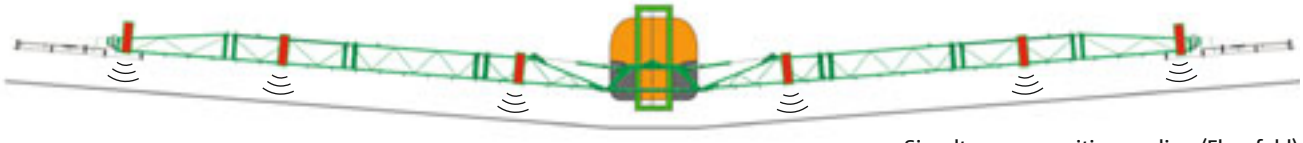
Flex-fold

The standard, electro-hydraulic Flex-fold mechanism of the boom with ContourControl controls each pivot point on the boom separately. This allows the boom to be folded out to a reduced working width from the tractor cab. The overload protection within the hydraulic system is simultaneously used as break back protection when working at these reduced working widths. The individual control of the hydraulic cylinders at the pivot points allows up to two segments to be folded out at a time on each side of the boom. This considerably reduces the down time when folding the boom in and out.

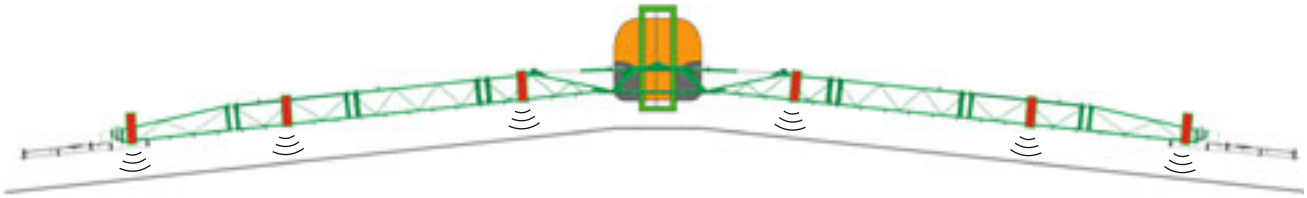
One-sided independent fold



One-sided positive angling on the right (Flex-fold)



Simultaneous positive angling (Flex-fold)



Simultaneous negative angling (Flex-fold)

Exact distance to the target surface for less drift

Future-proof technology
New and innovative technologies, such as row application on row crops or spot application on weeds, are now made possible for mounted sprayers.

IDEAS FOR OUR FUTURE

- Rapid, precise boom guidance for maximum work rates
- Distance of less than 50 cm to the target surface in conjunction with AmaSwitch fitted with quad nozzle bodies and a 25 cm nozzle spacing for reduced drift
- Flex-fold for quicker folding
- Simple folding of the boom to reduced working widths with integrated break back protection for use in different tramline systems
- Future-proof technology, optimally equipped for row and spot application

for Innovation 2024

Innovations in electronics and SmartFarming

New functions for the AmaTron 4 ISOBUS terminal

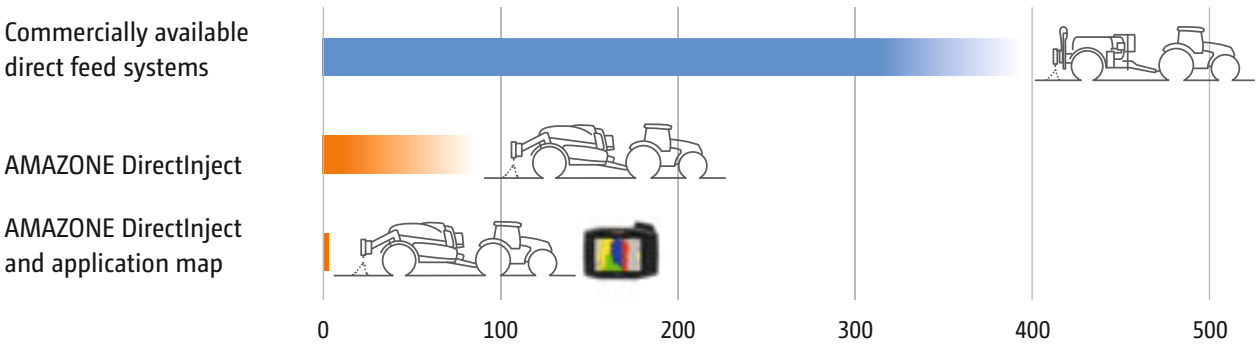
5 software functions for new possibilities within Precision Farming

The AmaTron 4 ISOBUS terminal was specially developed by AMAZONE and is used for monitoring and operating AMAZONE ISOBUS machinery as well as the ISOBUS machinery of other manufacturers. AmaTron 4 has been exceptionally well received since its launch onto the market in 2018 especially as a result of its practice-oriented and clearly arranged menu prompting, which offers the user comfortable and intuitive operation at all times. Special software functions for AmaTron 4 are a highlight.
At AMAZONE, “More than ISOBUS” stands for special terminal and machine functions which offer the user added value in the precision farming sector. Well-known functions with a unique selling point which are made possible in combination with AmaTron 4 as an ISOBUS terminal, include the HeadlandControl headland management system as well as the parabolic switching characteristic with an AMAZONE ZA-TS fertiliser spreader or automatic boom lowering with an AMAZONE crop protection sprayer.
The latest software of AmaTron 4 now offers even more additional functions in combination with AMAZONE crop protection sprayers, seed drills, fertiliser spreaders and for data management.

Processing of spot application maps – AmaSelect spot
Weeds are spread heterogeneously over the field and can often be found either in patches or in strips. With AmaSelect individual nozzle control, AMAZONE has offered an option for part-area, site-specific weed treatment based on highly accurate spot application maps since 2019. To begin with, the area to be treated and its weed distribution is scanned via a service provider and the data processed to create a spot application map. In the second step, weeds are spot-treated across the surface area.

These point or multipoint maps can now be comfortably loaded into the terminal via the AmaTron 4 Import menu. When passing over the area, AmaSelect spot opens the nozzles exclusively at the points marked on the application map, so that only the previously analysed weeds are treated. This enables very precise spot application on the weeds and provides potential savings on plant protection agents of up to 80 %, depending on the weed cover. This protects the environment and also prevents the development of resistance thanks to small-area spot applications with a 100 % concentration of plant protection agent. The application is particularly comfortable for the driver when the AmaTron Twin App for AmaTron 4 is used. The driver has both the machine operation menu and the map view with the spot areas in sight at all times here.

Comfortable processing of spot application maps. In addition to the AmaTron 4 machine operation menu, the driver always has the spot map in view in the AmaTron Twin App



The response time is automatically calculated when using application maps and the DirectInject agent is precisely metered on the basis of the already worked area and the route function of GPS ScenarioControl.

In advance with pinpoint accuracy with DirectInject
The DirectInject system from AMAZONE enables the needs-based supply of plant protection agents during the application, so that specific products and agents are only applied in patches or to individual areas. With DirectInject, it is possible to respond individually to the needs of the crop on the field and reduce the use of plant protection agents and the number of additional passes with the sprayer. The well-known special features of this system include complete integration in the spray agent circuit, ISOBUS control of the sprayer and the extremely short response time.

The possibility of metering the additional agent in advance with pinpoint accuracy by means of application maps has now been added. The spray rate of both the agent in the main tank and the agent from the direct feed system can be automatically regulated. The DirectInject agent is pre-metered before arrival in the treatment zone and is immediately available on reaching the zone. The route function from GPS ScenarioControl, which represents an add-on for AmaTron 4 in combination with the AmaTron Twin App, is used to provide an accurate forecast. It is known which application areas will be passed through next because of the route stored in the scenario and knowledge of the area already treated. This provides optimum small-scale treatment with extremely high precision.

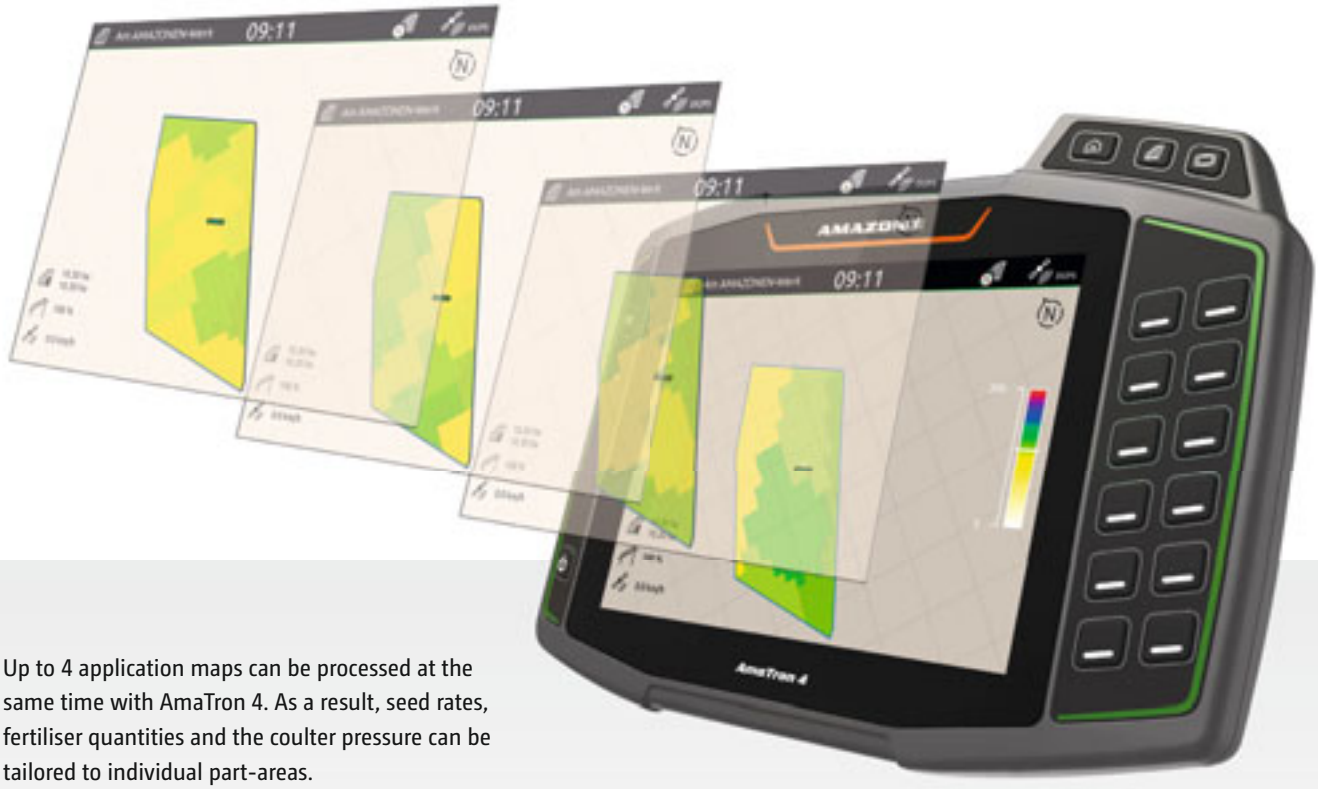
Weed patches can be individually and precisely treated in the field by means of DirectInject and the use of application maps.

Soil differences can be considered on a part-area, site-specific basis and yield potentials exploited to the full.

MultiMap –
part-area, site-specific application for any medium

The application of more than one medium has become commonplace, especially during sowing. The use of several hoppers enables the application of not only seed but also fertiliser, micro-granules, a companion crop or undersown crops at the same time during the same pass. Since the soil conditions, water availability and therefore also the yield potential can sometimes vary greatly within a field, it makes sense to tailor seed and fertiliser rates to these conditions.

The MultiMap function is a component of the AmaTron 4 terminal licence GPS-Maps&Doc and enables the applied materials to be regulated independently of each other via application maps, so that they are applied on a part-area, site-specific basis. In addition to part-area, site-specific sowing and fertilisation, the coulter pressure can also be regulated depending on the soil quality based on a soil texture map. Variable soil conditions are compensated for and an even seed placement is obtained. AmaTron 4 allows the simultaneous processing of up to 4 application maps. As a result, nothing stands in the way of farming practice adapted to local conditions.



Up to 4 application maps can be processed at the same time with AmaTron 4. As a result, seed rates, fertiliser quantities and the coulter pressure can be tailored to individual part-areas.

GPS ScenarioControl is used in conjunction with the AmaTron 4 ISOBUS terminal and the AmaTron Twin App.

GPS ScenarioControl for the automation of recurring work steps

When applying fertiliser, drivers have to juggle various tasks. Tasks which are mostly repeated on the field, from fertiliser application to fertiliser application as well as from year to year. This concerns driving and turning in the field on the one hand and the activation and deactivation as well as the selection of the correct border spreading modes and HeadlandControl on the other. These are work steps where drivers have to make a decision and mistakes are the order of the day, especially in the case of inexperienced drivers or drivers unfamiliar with the area.

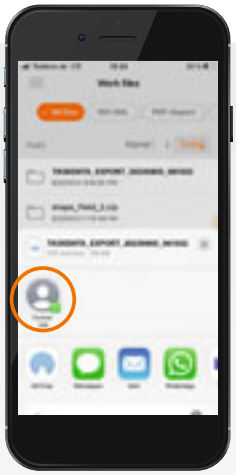
With GPS ScenarioControl, the route and border spreading modes are recorded and geo-referenced on a one-off basis and automatically replayed during subsequent applications to assist the driver. GPS ScenarioControl is an additional application for the AmaTron 4 ISOBUS terminal and can be viewed and operated via the AmaTron Twin display extension. In the AmaTron Twin App, the route is clearly displayed to the driver and the stored border spreading setting is automatically activated or deactivated on passing a switch point. This ensures error-free and legally-compliant fertiliser application as well as making the work easier.

Furthermore, the route function is not restricted to the fertiliser application but can be used with any desired connected implement. Once stored in the scenario, the route can also be used, for example, for the application of plant protection agents, thereby ensuring the same routes in the field at all times and preventing the flattening of crops by taking wrong turns in tramlines. Combined with the use of application maps, the route function enables spot-accurate metering of the additional agent.

Field with complete route and saved geo-referenced scenarios. The border spreading modes are automatically activated and deactivated when driving in the field and are stored behind each switch point

The driver receives new job data from the farm manager directly on his or her smartphone via a messenger service.

The driver sends the job to the myAmaRouter App and automatically receives an import request in AmaTron 4 if a hotspot is present.



The driver can export the completed job from the terminal and send it to the farm manager via a messenger service for documentation.

Sharing job data from AmaTron 4 via smartphone

If job data is to be used in AmaTron 4, in order, for instance, to carry out part-area, site-specific application, there are various ways of importing it to the terminal and exporting it after work has been completed for the purposes of documentation. The usual method is to insert a USB stick in the AmaTron 4, so that jobs can be exchanged. AmaTron 4 is able to process job data in both ISO-XML format and from a Shape file. An ISO-XML TaskSet can be exported for the purposes of documentation or a PDF export of the work can be easily and comfortably created and saved on the USB stick. The PDF export can be viewed on the computer and saved or printed out. The option of using the agrirouter as a data exchange interface for exchanging job data online with AmaTron 4 by means of the AMAZONE myAmaRouter App already exists. This simplifies data exchange and avoids the need for a USB stick.

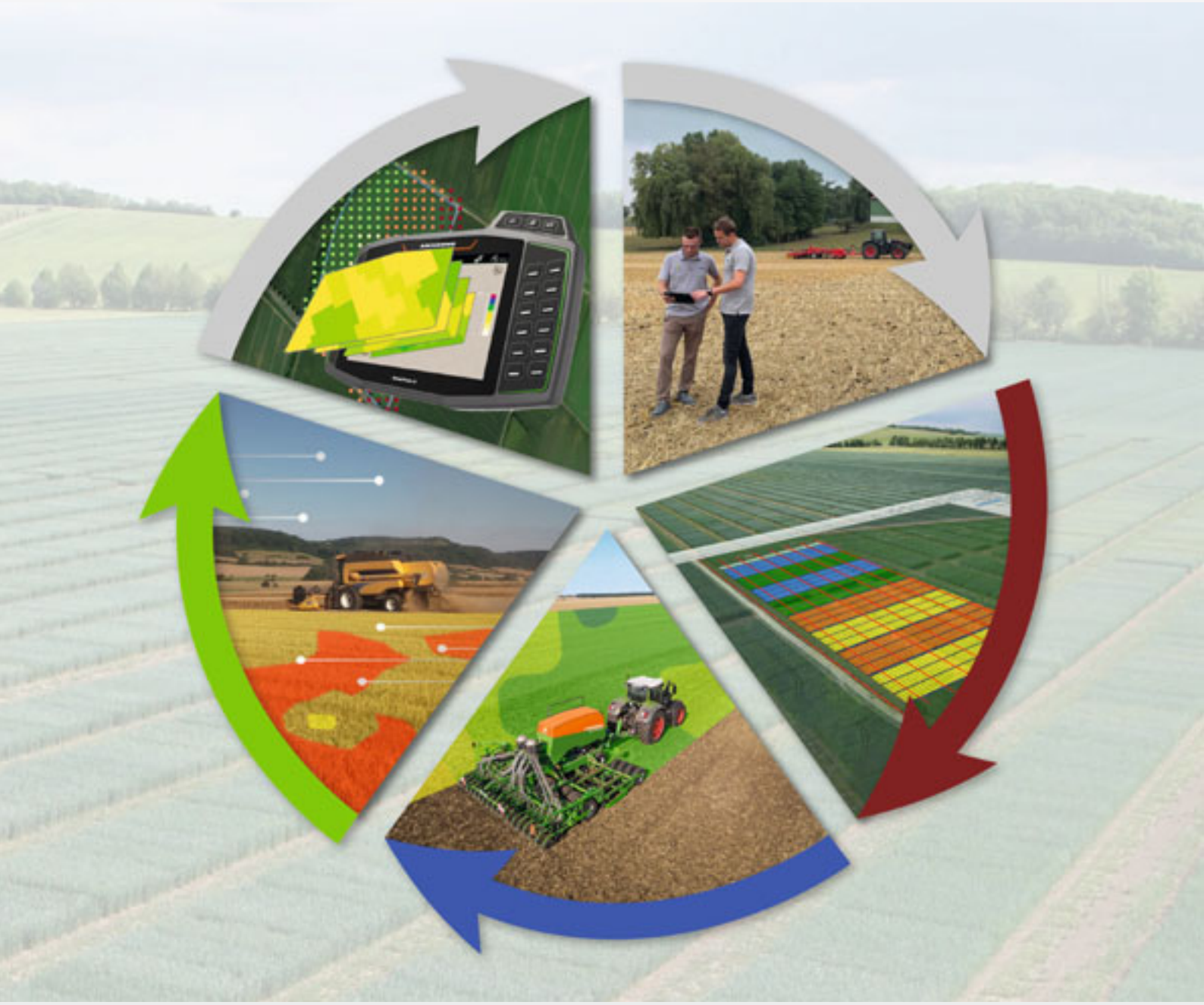
AMAZONE has now made data exchange with AmaTron 4 even simpler, with the result that job data can be sent easily and comfortably to the AmaTron 4 via a smartphone and also accessed by the AmaTron 4. This sharing function is already known from smartphone use and is enabled via the myAmaRouter App. An agrirouter connection is not required for this but is possible. Both ISO-XML and Shape files can be shared from email services and standard messenger services and transferred directly to the AmaTron 4. This function also allows completed jobs in AmaTron 4 to be exported from the terminal in ISO-XML or pdf format and shared as desired via a smartphone. This further facilitates data exchange and ensures a high degree of flexibility between the map creator (e.g. farm manager) and the driver.

IDEAS FOR OUR FUTURE

- AmaTron 4 ISOBUS terminal offers 5 innovative additional functions for precision farming
- Comfortable and precise cultivation of part-areas down to the individual plant
- Reduced workload and more flexibility through simplified digital data management and automated switching operations
- Optimised and resource-conserving use of inputs

ISO Farm Research

DLG-Agrifuture Concept Winner 2023



ISO FARM RESEARCH

The second round of voting for this year's DLG-Agrifuture Concept Winner Awards for pioneering work and future visions in agricultural technology has ended: ISO FARM RESEARCH (IFR) is one of the DLG-Agrifuture Concept Winner of the year 2023. All partners are very proud and happy about this special award.

AMAZONE, EXAgT, EXA Computing, geo-konzept, Hanse-Agro, the Kiel University of Applied Sciences and the start-up AgDoIT have jointly developed a new concept to provide a decisive impetus for the future viability of crop production worldwide: ISO Farm Research - for all-around efficient and safe on-farm experiments with automated trial design, implementation, data acquisition and analysis.

Increasing complexity in agriculture

Agricultural practice is facing major changes and becoming more complex. Climatic changes are leading to a holistic rethinking of agricultural production. In addition, agricultural policies, such as the farm-to-fork strategy, demand a reduction in the use of fertilizers and pesticides, as well as climate- and resource-friendly management of agricultural land. One-size-fits-all solutions are being replaced by site-specific, site-adapted and variable applications of crop protection products and fertilizers. New digital technologies such as spot or row spraying already offer good solutions and enable even more precise and site-adapted applications. The use of biologicals is considered very sustainable, but they can have very different effects depending on the site and conditions to be better understood.

Such new innovations can already be tested in practical farming trials, known as on-farm research. There are clear principles for this, but they are not easy to put into practice. Field trials have been difficult to integrate into everyday work, and proper data management is a major challenge, making trials prone to error.

However, field trials are becoming increasingly important for agribusiness success, extension and product development. In the future, they will be seen as the key to understanding new production ideas and making informed decisions. The

IFR ISO FARM RESEARCH

need for on-farm trials is growing worldwide. However, there is a lack of an easy-to-use, powerful and secure system to better integrate collected field information with existing machine characteristics.

The ISO Farm Research concept

For this reason, AMAZONE, EXAgT, EXA Computing, geo-konzept, Hanse-Agro, the FH Kiel and the startup AgDoIT have developed the ISO Farm Research concept: a novel and innovative digital system that automates and simplifies field trials (On Farm Research, OFR) based on agricultural data and the ISOBUS standard. ISO Farm Research combines all farm agronomic data into one data pool to create a holistic picture of the farm including FMIS data, soil information and agrotechnical measures. Machine learning is used to automatically create an ideal trial design.

Trials and measurements are consistently verified to field trial standards. ISO Farm Research is vendor neutral and allows integration of existing mix fleets and automation with ISOBUS to ensure accurate placement and trial layout. Machine characteristics are taken into account and each rating is accurately pre-planned. Drones and sensors can also be used to perform geo-referenced assessments, as well as import crop data and yield mapping from various sources. All trial data is consolidated centrally and evaluated smartly, and can be viewed at any time via app and shared with partners.

ISO Farm Research will be a secure and user-friendly tool to drive knowledge-based transformation in the agricultural technology industry and help farmers make their operations more efficient, sustainable and competitive.

for Innovation 2024

Innovations in automated and autonomous work

Joined forces:

CLAAS, AgXeed and AMAZONE establish world-first multi-manufacturer autonomy group

Multi-manufacturer partnership for highly automated and autonomous fieldwork

CLAAS, AgXeed and AMAZONE have set up the first autonomy group and are unveiling solutions for highly automated and autonomous fieldwork. Other partners are expected to join them in time for Agritechnica.

3A

CLAAS, AgXeed and AMAZONE have stepped up their collaboration in the field of highly automated and autonomous agricultural machinery and work processes by establishing the first multi-manufacturer autonomy group. 3A – ADVANCED AUTOMATION & AUTONOMY aims to accelerate the development, standardisation and market introduction of semi- and fully autonomous tractor-implement combinations through their combined expertise and is open to other agricultural machinery manufacturers.

3A – ADVANCED AUTOMATION & AUTONOMY: multi-manufacturer, multi-brand partnership for more efficiency

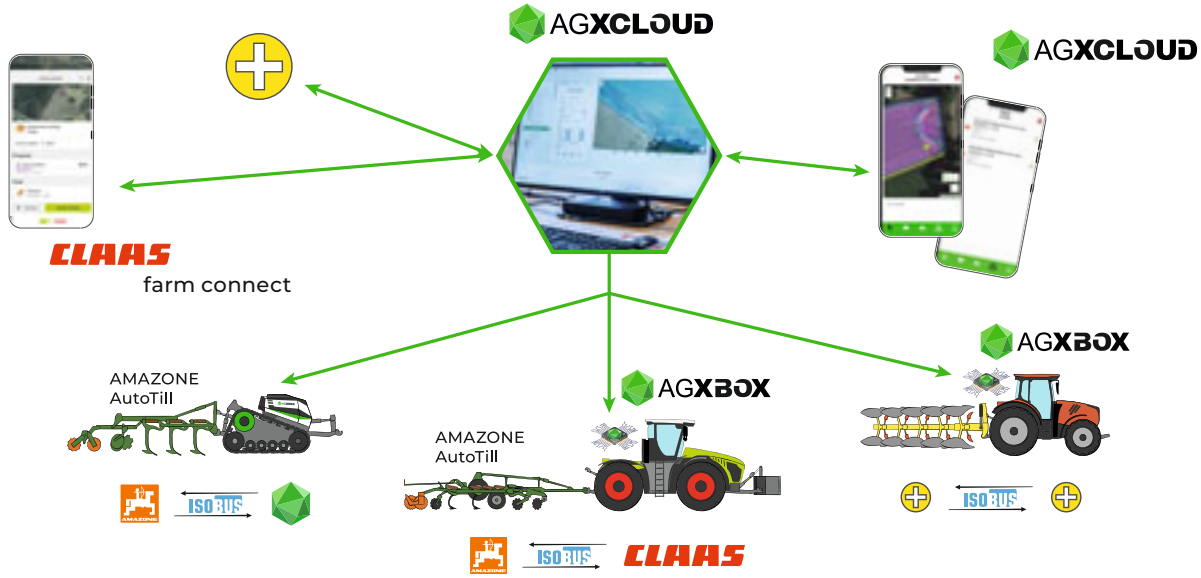
In many regions of the world, a shortage of skilled labour is a major factor driving the development of highly automated and autonomous technologies in industry and agriculture. The aim is not to replace skilled workers, but to free them up for more demanding tasks, especially at peak times. The 2023 grain harvest in central and northern Europe is a good example: threshing, stubble working, primary tillage and drilling cover crops and follow-on crops all had to be performed simultaneously due to weather-related harvest delays, at a time when skilled workers were often unavailable. New technologies can manage these peaks and make it possible in future to achieve optimum results even with less experienced staff.

However, the further automation of agricultural processes calls for even closer collaboration between manufacturers of tractors and carrier vehicles on the one hand and implements on the other. In recognition of this, CLAAS, AgXeed and AMAZONE have joined forces to establish 3A – ADVANCED AUTOMATION & AUTONOMY. The three partners have been working together in the field of autonomy for some time already – CLAAS and AMAZONE are minority shareholders in the Dutch company AgXeed. Through the establishment of 3A, the companies will more closely integrate their individual areas of expertise and create further partnerships to enable the developed technologies to be rolled out more rapidly and on a broader basis.

Initial solutions for agricultural practice

The market-ready technology developed by the 3A group comprises design and implementation software which was previously available only for autonomous field robots, but can now be used in conjunction with the Agxeed box to control tractors and implements as well. Depending on the requirements and the available hardware, the level of control can range from highly automated to autonomous. From planning through to implementation and analysis, the technology eases the workload of both farm managers and operators and increases the efficiency of agricultural processes.

Operating principle



"Agricultural robots currently act mainly in closed systems with limited applications and without the option of being able to use them in parallel or in combination with other vehicles and implements," the development team explains. "And this is where 3A's innovative approach comes in: within the group, we have developed the Agxeed box technology, which for the first time connects tractors and implements to the planning and autonomous implementation process using the standardised ISOBUS interface. Via this interface, implements can interact with field robots, AgBots and tractors to enable automated or autonomous process optimisation."

The first products developed by 3A are the AMAZONE AutoTill for mulch cultivators and CLAAS Autonomy connect, which incorporates the entire tillage planning and implementation process. These solutions, which have been tested under field conditions, are the starting point for further multi-manufacturer applications involving every conceivable machine combination for outdoor work processes.

More than just task planning: planning ahead with real-life machine parameters

In addition to A-B lines and A-B contours for automatic steering, and route optimisation, work orders for tractors nowadays may include an application map. 3A goes one step further and enables preliminary planning specifically engineered for process optimisation. This includes the start and end point of application, headland turns and site-specific implement control. Planning ahead with real-life machine parameters – for example rear linkage and hydraulic functions for adjusting the working depth and intensity – makes it possible to program dynamic adjustments to the machine combination before implementation in order to achieve the desired quality of work. Up until now, closed systems have included neither planning nor supervision of the implements and the subsequent implementation process, with the exception of application rates. But with Autonomy connect, CLAAS tractors in conjunction with implements can perform fieldwork with a high degree of automation, or even autonomously. Depending on the degree of automation, the operator can perform other tasks from the cab, or even in the field or yard. Tasks are planned in the familiar CLAAS farm management information system (FMIS) or the AgXeed portal, where it has long been possible to schedule tracks and application maps for tasks.

Up to now, approaches to tillage automation have been limited to comfort functions. AutoTill for AMAZONE cultivators continuously compares the tillage operating procedure

3A

with data from the tractors, thereby taking responsibility for the operator's supervisory tasks.

CLAAS Autonomy connect, AMAZONE AutoTill and AgXeed AgBot offer a wealth of significant advantages for the user:

- Both the tractor and the implement perform all operations precisely as the farmer or contractor has planned.
- The planning function not only calculates the best possible route; it also ensures that the tractor-implement combination is optimally configured. This prevents poor quality work and inefficiency resulting from incorrect settings.
- The first plan forms the basis for reducing the workload in subsequent years, as only seasonal adjustments are then required – for example, depending on the main crop, follow-on crop and rotation.
- Errors by the machine combination are detected by sensors and automatically corrected to maintain consistently high process quality. For example, the system automatically detects when the cultivator is at risk of clogging and adjusts the working depth and speed accordingly.
- Responsibility for producing optimum results no longer lies solely with the operator, which reduces the pressure on them, especially during long working days.
- Preplanned and process-optimised machine-implement combinations are more energy efficient and thus more cost-effective to operate.
- Farmers and highly qualified operators can perform other more important operational tasks while the planned task is being performed, since constant supervision is no longer needed. On non-autonomous tractors, the technology also enables less skilled or experienced operators to produce optimal results.

Talks are currently underway with other machine manufacturers who are interested in joining the multi-manufacturer group and thus play an active role in expanding the range of applications.

AMAZONE AutoTill

The solution for automated and autonomous soil tillage

Cenio with AutoTill in use with an AgBot

Distance measuring system for setting the working depth via the rear roller

Automatic setting and function monitoring of the machine is made possible thanks to the new AutoTill system for mulch cultivators. This system makes it possible for the machine to set itself automatically in accordance with pre-defined parameters (working depth and speed) and to monitor the functionality of the machine independently.

AutoTill can, in the first step, also monitor the functionality of the machine, in combination with a standard tractor, using ISOBUS, and can warn the driver of problems with the machine.

In the second step, the system can communicate via ISOBUS, in combination with a standard tractor and an Agxeed box, and can independently react to the problems from the error messages received from the sensors in the machine. This means that the driver's tasks are reduced even more, giving him more time to concentrate on his surroundings.

In the third step, AutoTill operates autonomously with a robot. The cultivator can communicate with the robot in this level, thanks to ISOBUS communication, and can monitor the functionality of the machine and react independently to irregularities in the job. The mulch cultivator informs the robot how to resolve any potential problems. This ensures high levels of operational reliability in autonomous working.

AutoTill demonstrates its strengths in the second level on long working days at high working speeds. It is often difficult to monitor the whole machine from the cab on account of the dust being generated, particularly with wide working widths. This increases the pressure on the driver.

AutoTill provides support for the driver and thus reduces his workload. This means that even long working days are no problem for the driver, and the quality of work remains at a consistently high level.

Various different sensors help with monitoring the function of the machine

① Information of the tractor unit
② Activity of the **overload safety device**
③ Setting the **working depth**
④ Preventing **blockages**
⑤ Detection **share loss**
⑥ Monitoring the **roller speed**

Blockage detection integrated in the tine element

A great benefit of the third step is that the machine is set up ready for autonomous driving as a result of the sensor systems. This will increase in significance in the future on account of the skill shortage in agriculture.

AMAZONE has concentrated on looking at different sensor systems for monitoring the performance into the mulch cultivator in order to ensure the successful introduction of autonomous soil tillage.

Various different sensor systems for monitoring the job have been integrated into the machine to make AutoTill feasible.

Automatic setting of the working depth in the second and third steps

One difficulty in day-to-day working with a mulch cultivator, is aligning the machine parallel to the ground as the working depth changes. Consistent, even working can only be guaranteed by parallel alignment of the frame to the ground using the top link.

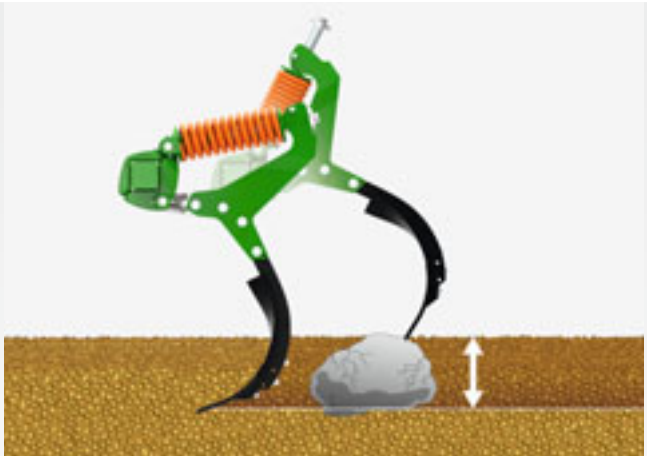
The working depth can be set automatically to suit the surface thanks to the tilt sensor on the frame and the distance measuring system on the depth control cylinder of the roller. Using the communication between the tractor and the mulch cultivator coupled to the three-point attachment, you can first alter the depth of the rear tines via the rear roller via the AutoTill. The signal for changing the length of the top link is sent to the tractor by the tilt sensor. This then adjusts the length of the hydraulic top link until it receives a signal from the tilt sensor to report that the cultivator is aligned parallel to the ground again. This means that the front tines are now working at the same depth as the rear ones.

In this way, both the correct setting of the machine can be guaranteed, and, on the other hand, varying working depths can also be actuated when planning the work in the field.

Constant operational reliability

Mulch cultivators are designed with a frame height, tine spacing, and tine stagger that permit even large volumes of organic material and soil to flow through the device.

However, blockages may occur under unfavourable conditions, such as with lodged grain, for example. In this case, it is particularly important in autonomous driving, that this blockage is detected early and is rectified using AutoTill. The driver is also supported by the system with automatic working when using a standard tractor. This means that the



Monitoring the overload safety device for mapping the soil conditions

AutoTill can detect blockages in the machine which are difficult or impossible for the driver to detect because of the dust generated whilst working. This further increases the operational reliability of the machine.

With AutoTill, AMAZONE has developed a mechanical function monitor that detects blockages caused by organic material in the machine at an early stage, thus preventing a complete blockage. Detection is by means of pressure sensors integrated in the tine element. They detect, at an early stage, whether organic material or soil is building up in the machine, they issue a warning to the driver, and instigate a solution of the problem. The benefit of the mechanical system, as opposed to a camera system, is in the operational reliability. Camera systems are at the limit of their capabilities during soil tillage on account of the amount of dust. In addition, cameras are often exposed to stones and soil during soil tillage, and this can quickly lead to damage to the cameras.

The travelling speed of the roller is also measured and compared to that of the tractor. The calculated difference between the travelling speed of the tractor and the roller allows you to detect slip on the roller. This allows you to detect a build-up of soil in front of the rear roller.

There are various different strategies incorporated into AutoTill to resolve a blockage problem.

One solution is that the system reduces the working depth and the working speed when a blockage is detected, and which can resolve the blockage within the tine element. It is possible to store additional variations for resolving problems into AutoTill to match the soils and surface organic matter and to select them as a solution strategy during the pre-planning.

In this way, we can ensure that the machine will react to problem situations independently and ensure that autonomous operation is also retained under difficult conditions.

Inductive sensor for monitoring the shares

The pressure on the driver is also further reduced by automatic working.

Monitoring the overload safety device
Monitoring the overload safety device makes it possible to monitor the performance limits of the cultivator. This helps with selecting the shares and the corresponding working depth. For example, when working at a greater depth with 80 mm wide shares and 350 mm wing shares, the system can issue a recommendation to change the shares if the overload safety device triggers repeatedly.

Accordingly, at the stipulated parameters “Working Depth 30 cm” and “Working Speed 10 km/h”, AutoTill can indicate the recommendation on the terminal, in this case to change to a 40 mm narrow share. This will reduce the load on the cultivator, the wear on the shares, and the fuel consumption.

In addition, the system can detect the soil conditions, harmful compaction, and larger stones within the soil, and they can then be specifically loosened or subsequently be removed.

Monitoring the share points
The share points are monitored by an inductive sensor in order to provide high levels of operational reliability and working quality of the mulch cultivator. The use of this sensor means that you can detect the loss of a point caused by a collision with a stone, for example. This monitoring system warns the driver directly that a point is defective. This allows the driver to replace the point in good time, before the tine stem can suffer any wear. This minimises downtime and wear costs.

AutoTill for automatic and autonomous driving
AutoTill makes it possible to use a mulch cultivator automatically with a standard tractor with ISOBUS functionality in order to support the driver when using the mounted unit. This means that long days in the field are no problem for the driver.

The benefit of autonomous working lies in the independent detection and solution of problems on the ground. In combination with the 3A concept (Advanced Automation and Autonomy – the open partnership for more efficiency and empowerment) it is now possible to carry out planning of a

job, working the soil in an operationally reliable and autonomous manner, and providing documentation of the job. Problem situations can be resolved autonomously whilst working thanks to the communication between the tractor and the mounted machine. This makes it possible to use autonomous tractors and mounted machinery in 24-hour shifts in a highly-efficient manner.

IDEAS FOR OUR FUTURE

- Soil tillage can be carried out automatically and the load on the driver can be reduced
- The system can operate autonomously in combination with robots
- Faults in the field are detected and automatically prevented
- Expenditure on personnel is reduced
- Increased efficiency, reduced operating and machine costs

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