INNOVATION IN AGRO-EQUIPMENT AND THE MAIN TRENDS OF SIMA-SIMAGENA 2015

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Three main trends are highlighted by the results of the SIMA Innovations Awards 2015; one of them marks a major turning point in the relationship between machines and agronomy:

1. **The development of the AgroTIC**[1]. The machine positions itself at the core of the farm's information system and its various components (mechanical, electronic, automated control and IT) are closely associated and interdependent. The machines participate in *«Measured agriculture»* or *AgroTIC™*, because they collect information that will be transmitted, analysed and used to add value in agronomic terms, and these machines will be capable of adjusting their actions from the feedback that they will receive (what is known as *«Data Driven Agriculture»* in English-speaking countries).
2. **The safety of machines and operators**. As the increase in the size of machines has led to more risks for their users, manufacturers are innovating to resolve problems such as connecting machines, the risks of overturning and the detection of obstacles.
3. **The performance of machines and production outputs**. Over the last few decades, production outputs have been increased by increasing the size of machines, and in particular, working widths. This development raises the problem of agricultural machines travelling on roads. Manufacturers are now turning towards other optimisations, such as improving the working speed, reducing downtime or increasing the performance of the internal circuits of the machines.

1 - THE MACHINE BECOMES A CONNECTED OBJECT AT THE CORE OF THE FARM'S INFORMATION AND COMMUNICATION SYSTEM: L'AGROTIC™

Applications on smartphones and tablets, Isobus network, Internet connections,… these are all tools and systems that are generalised on farms. Nowadays, it is the functions offered by these tools, which have reached maturity, that provide innovation.

- **The Isobus network** can offer new functions or improve existing ones: controlling internal components becomes more precise and individualised. These are the beginnings of Computer-Assisted Agronomy. It is thus possible to precisely adjust doses of fertiliser, pesticides or seeds, element by element, like the **high-speed precision seed drill** from John Deere **(Gold Medal) or automatic and independent adjustment on a centrifuge fertiliser spreader** from Sulky Burel (Special Mention).
  Data is collected both concerning the workings of the machine (the GPS position and working parameters are recorded), and concerning the crop itself, to make best use of this information at the agronomic level, as in the John Deere **high-speed seed-drill.** This type of approach is also found on tools that are not Isobus, like the **system for guiding a harrowing machine by computer vision and centrimetric GPS** from Razol (Special Mention) or the **autonomous robot for harrowing and acquisition of crop monitoring data** from Carré (Special Mention).

- **Transferring information between different systems** is still quite complicated, as users are confronted with compatibility problems. **The precision agriculture software module** from MaFerme-Néotic (Special Mention) allows smooth exchange of data with no compatibility problems and in both directions (transmission of data and reception of advice), between the agricultural machine's Isobus network and the provider of the remote detection service by satellite or drone.
  Thanks to the use of roaming tools (tablet computers,…) Müller Electronick France is offering **an efficient and useful tool for diagnosing, detecting and locating breakdowns for Isobus tools** (Special Mention).

  Concerning compatibility between equipment, the AEF has provided a new web application for **checking the compatibility between tractors and Isobus tools** (Special Mention).

- **The use of tablets and smartphones** is growing strongly, with applications intended mainly to facilitate data collection and product traceability. This is the case of **the farm-management assistance application and tool from Hardi-Evrard** (Special Mention) which automatically scans and records the pesticide products used.

- **The use of electric motors** is growing strongly. Certain tools such as fertiliser spreaders and seed drills are now entirely driven by small electric motors instead of mechanical or hydraulic transmissions. But this recent trend assumes that the tractor can supply the necessary electrical power. With its **system for sharing electricity between the farm, the tractor and tools** (Special Mention), John Deere offers a complete solution, from storing electricity produced on the farm until its use to drive the various motors present on the attached tools or to provide extra power to the tractor.

- **In matters of ICT and new technologies** for collecting ground data and for ever more targeted intervention in plots, the trend is also towards the **use of robots and drones**. In this «drones for agriculture» sector, there are numerous and often identical service proposals for farmers. This goes from the collection of remote-detection images or other information to the spreading of liquid or solid products.

(1) AgroTIC™ is a specialisation common to the engineering schools Montpellier SupAgro and Bordeaux Sciences Agro. Over the last 20 years, it has been training engineers in the dual skills of Agronomy and ICT (Information & Communication Technologies).

2 - THE SAFETY OF MACHINES AND OPERATORS

Safety is an essential element in the design of machines, but the usage conditions of machines and the potential risks related to farming are often significant obstacles to innovation.

- To combat the risk of **musculo-skeletal disorders,** certain manufacturers are trying to provide solutions to stop the driver having to undergo contortions. Thus, **Claas offers a panoramic cab (Gold Medal)** in which the upper horizontal crosspiece has been eliminated, to give a wider field of vision.
  The **«Head high vision» system** offered by Agrotronix (Special Mention) lets the driver see selected information and images from on-board cameras displayed on the tractor's windscreen, while continuing to look in the line of advance.
  Lastly, IFM Electronic offers **an intelligent 3-D detector for mobile machinery** (Special Mention), capable of detecting the position, size, trajectory and speed relative to around twenty obstacles placed in its field of vision.

- To combat the risk of the vehicle overturning, Merlo is offering a **system to control the transversal stability of telescopic loaders** (Special Mention), as a supplement to the existing longitudinal control.

- To help to prevent accidents in the tool connection and de-connection phases, several manufacturers offer systems for assistance or automation in connecting the tractor and its tools, or connecting tools between each other. Thus, the **fully automated connection system** from John Deere **(Silver Medal)** can connect all semi-mounted tools without descending from the cab. The tractor just needs to be placed in front of the tool and the operation is triggered: the tractor, guided by a camera, reverses towards the tool, to couple it. When locking the connecting system, all servo-mechanisms are connected.
  For its part, Rolland Remorques offers **an easy system for connecting trailers with auto-piloted axles** (Special Mention) which allows one person to effortlessly connect the axle jacks for a vehicle with 2 or 3 axles. The system locks automatically after the first few metres of motion.

- Lastly, to combat accidents related to handling pesticides, Berthoud offers **a secure intake system (Silver Medal)** which avoids any risk while using or rinsing the drums.

3 - THE PERFORMANCE OF MACHINES AND PRODUCTION OUTPUTS

- **In matters of sowing**, speed has long been the enemy of quality and precision. With the **high-speed precision seed drill** from John Deere **(Gold medal)**, it is possible to sow at high speed (> 16 km/h) while obtaining excellent sowing quality.

- **In the field of pressing and taping,** numerous manufacturers offer innovations this year concerning increased production outputs and/or simplification of taping operations. With its **non-stop combined hay press-baler**, Kverneland **(Silver Medal)** obtains a great increase in production output. Its 2-chamber system, which alternately fills with fodder, can press and tape without interruption.
  With the **integrated system for taping round bales**, the manufacturer McHale (Special Mention) provides a taped bale without binding by string or thread. The taping film holds the bale and provides better fodder quality because the air is expelled from the bale when it is bound with the taping film.

- **Transition from harvesting one crop to another** (wheat/oilseed rape, for example) now requires the necessary modifications to the machine to be carried out quickly. With the **cutter bar** from Claas (Special Mention), it is possible to make the changes to the cut in less than a minute and with no tools.
  Still in the area of harvesting cereals, the trend is towards improving the performance of the internal circuits of machines (particularly separation and ventilation). The recovery of chaff is also studied closely. Usable as litter or to produce power, it contains weed seeds that are harmful for subsequent crops. Perard offers a system for recovering chaff (Special Mention) that can collect and package it and get rid of most of the weed seeds.

- Concerning the maintenance of irrigation facilities, Lindsay Europe presents **an anti-puncture wheel, with no tyre or chamber,** for irrigation ramps (Special Mention). This wheel requires no monitoring or maintenance.

- Concerning **performance**, the trend is towards **tracking down unnecessary expenses. Comer Industries Spa is offering a system aiming to improve the efficiency of oil-bath brakes** (Special Mention). In normal operation, the oil is not in contact with the brake discs, but is injected only while braking, which reduces energy dissipation because the oil is no longer agitated by the discs.

- The trend is also towards **quality of work**, particularly in the area of spraying. Horsch presents **a crop spraying machine** (Special Mention) **fitted with slot nozzles with an angle of 80° and placed every 25 cm.** Combined with a ramp stabilisation system, these nozzles make it possible to lower the ramp as close as possible to the vegetation, thus improving the penetration of products while limiting drift.

RESULTS OF THE 2015 SIMA INNOVATION AWARDS

GOLD MEDALS

CLAAS	Panoramic cab
JOHN DEERE	High-speed precision seed drill

SILVER MEDALS

BERTHOUD	Secure pesticide-products intake
JOHN DEERE	Fully-automated connection system
KVERNELAND GROUP	Non-stop combined press-baler

SPECIAL MENTIONS

AEF	Web application for checking compatibility between tractors – tools – Isobus consoles
AGROTRONIX	Head high vision
CARRE	Robot for hoeing and aid with decision-making
CLAAS	Cutter bar
COMER INDUSTRIES	Solution to improve the efficiency of oil-bath brakes
HARDI-EVRARD	Application and tool for assistance with farm management
HORSCH	Crop spraying machine
IFM ELECTRONIC	Intelligent 3-D detector for mobile machinery
JOHN DEERE	System for sharing electricity between the farm, the tractor and tools
LINDSAY EUROPE	Anti-puncture wheel, with no tyre or chamber for frontal irrigation pivot and ramp
MAFERME-NEOTIC	Full web precision agriculture module
McHale	Press-baler with plastic-film binding system
MERLO	Lateral and longitudinal machine stability control system
MULLER ELEKTRONIK	Diagnostic tool for Isobus machines
PERARD	Chaff recovery
RAZOL	Guidance system for a harrowing machine by computer vision and centrimetric GPS
REMORQUES ROLLAND	Easy connection system for trailers with auto-piloted axles
SULKY BUREL	Automatic adjustment of independent right and left sides on an Isobus centrifuge spreader

GOLD MEDALS

CLAAS
Panoramic cab
Product trade name: Panoramic Cab for new Arion 400

The new cab structure of the ARION T4f offers an optimal view of the front loader and/or front lift, thanks to a wide continuous 90° field of vision.
The main characteristic is that it has successfully eliminated the upper horizontal crosspiece, which until now has been essential for successfully passing regulatory tests for protection against falling objects. From the floor to the roof, the large windscreen of 2.41 m² provides optimal visibility from the driver's seat. No blind angles obstruct the driver's visibility of his/her loader, making it possible to be always seated in the most comfortable position. All of the repetitive movements causing cervical and lumbar fatigue are therefore eliminated, as is the resulting backache. It is remarkable progress in terms of prevention, safety, comfort and productivity.

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JOHN DEERE
High-speed precision seed drill
Product trade name: Exactemerge Seed Drill

On this seed drill, the descent tube is replaced by a brush-belt. The seeds are actively transferred from the dispensing system to the belt, which transports them at controlled vertical speed to the base of the furrow.
The speeds of the dispensing element and the brush-belt for each sowing element are driven at the speed of advance. The seeds are placed at the base of the furrow with a nil horizontal speed, avoiding any risk of rebound and rolling. The speed determined at the level of the dispenser is fully complied with, including at high working speeds (up to 20 km/h).
The electric drive to the sowing elements can be manually or automatically cut off (edges, points).
It also allows automatically or manually varying the density of sowing (according to a pre-established map). Lastly, it opens the way, eventually, to row-by-row adjustment.
The seed counter fitted on each sowing element provides a display in the cabin, via the SeedStar console, of the essential parameters, such as: row spacing (row by row), momentary sowing density and the surface that has been sown. The sowing parameters can be transmitted in real time via Wireless Data Transfer and recorded on the portal MyJohnDeere.com, and the user can thus obtain a very precise map of the quality of the sowing (map showing missing and duplicated areas, the speed of work, the support pressure,…)

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SILVER MEDALS

BERTHOUD
Secure pesticide-products intake
Product trade name: B-safe

The B-safe system from BERTHOUD offers a secure solution for introducing pesticide products into crop spraying machines. The introduction of the various liquid products, and complete rinsing, is done without contact with the operator or the surrounding environment. This solution can equip all crop spraying machines, whether new or already in service, and is distinguished by its ease of use and adaptability to most of the product drums available on the market.
The system, which requires manual implementation, is composed of four separate parts: an adaptation handle, a rinsing jet tube, a Venturi and two quick connectors. This system was developed to connect to all appliances having an intake hopper, while leaving the option for the operator to continue to use this intake hopper for solid products.
B-safe thus eliminates the following known risks of contamination and pollution: – drum lid dirty – risk of overturning the drum after opening – product inhalation – splashes projected onto the operator and around the hopper – splashes projected when rinsing the drum.

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JOHN DEERE
Fully automated connection system
Product trade name: Autoconnect

The AutoConnect system is composed, on the tractor side, of a telescopic lifting hook equipped with a sphere, and, around the shaft of the power take-off, a plate carrying various female plugs, and at the rear of the cab, two cameras. On the tool side, a block is easily and quickly fitted on the original boom, including the female half-sphere, a plate carrying the male plugs and centralisers, and a support for the universal joint for the power take-off. The electrical, hydraulic and pneumatic servo-mechanisms for the tool are connected to this plate. An inclined panel with black and white squares is used as a target for the cameras. The whole acts as a hydraulic jack for the tool. Assembly does not require any modification to the tool.
To connect, the driver reverses the tractor roughly in line with the axis. Within less than 10 m from the tool, he/she triggers the manoeuver from his/her console. The cameras, acting on the tractor's transmission and steering, guide it towards the tool. Once the boom has been connected and raised, the telescopic arm retracts, connecting and then locking the power take-off and the various plugs.

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KVERNELAND GROUP
Non-stop combined press-baler
Product trade name: Vicon Fastbale

The Fastbale is composed of a round bale press fitted with 2 fixed-volume chambers, alongside a double rotary-element baler with no transfer system.
The core of the bale is shaped in the pre-chamber. Then, the flow of material coming from the supply rotor and the pre-shaped bale are both sent to the larger main chamber. The bale continues its formation until it reaches the maximum diameter of 1.25 m. The flow of material is then redirected to the pre-chamber while, at the rear, binding takes place in the main chamber. When this stage is finished, the door of the press opens and the bale is transferred to the film wrapping machine by pure gravity, with no mechanical elements. Once the door is closed, the press is in its initial configuration and the cycle can continue… Then, the film wrapping begins at the rear: the double rotary elements apply the film at high speed. When the cycle is finished, the rear part of the film wrapping machine lifts up to release the bale at ground level.
The capacity of conventional presses and combined press-balers is limited by the sequence where the bale is bound and ejected, when the progress of the tractor is stopped and the work is interrupted. Fastbale overcomes these stages. Yield and usage comfort are increased. Consumption and wear are limited.
Versatility is optimal because the Fastbale can be used in all types of green or dry products, in combined press-baler mode or in pressing mode alone. In the latter case, the bale is directly placed on the ground, as with a standard press.

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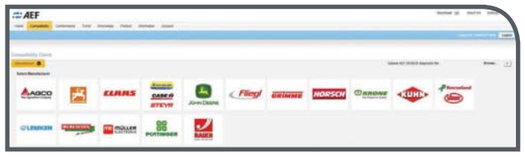
SPECIAL MENTIONS

Agricultural Industry Electronics Foundation (AEF)
Web application for checking compatibility between tractors – tools – Isobus consoles
Product trade name: AEF ISOBUS Database

The AEF has developed a test for the compliance of Isobus products. The results of these tests are stored in the AEF ISOBUS Database, www.aef-isobus-database.org. This freely-accessible database lets users check the compatibility between the tractors – tools – consoles that they plan to purchase. In just a few clicks, the user connects the equipment together and sees whether the selected combination is compatible and what functionalities it has. It is also possible to compare several alternatives. If an appliance is not in the database, it is because it is not certified.
Problem identification by the after-sales service is just as quick. And, if this were not enough, the user can directly contact the manufacturer using a ticket to obtain help.
All of the problems encountered and their solutions are documented in the database. This database is therefore constantly growing. This information is important because it contributes to improving the service provided to farmers and agricultural entrepreneurs. It avoids having to research the causes of a malfunction each time.
Ultimately, the AEF-ISOBUS is a valuable tool for all players in the agricultural field (users, dealers and manufacturers) when the new worldwide ISOBUS standards are used.



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AGROTRONIX

Head high vision
Product trade name: VTH user interface

The tractor is equipped with an on-board computer fitted with a pico-projector. The computer displays the information desired by the user on the tractor's windscreen.
This information is recovered on the CAN network. What is more, the user can also embed video coming from one or two cameras installed on the towed machine or the tractor.
The comfortable display of all control and guidance systems is not done to the detriment of continuous monitoring of the cab's field of vision. The user can look in front of the tractor while having access to the information that he/she considers essential.

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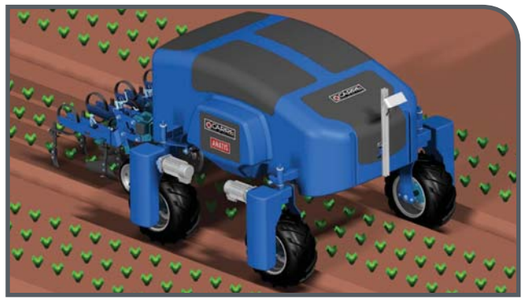
CARRE

Robot for hoeing and aid with decision-making
Product trade name: Anatis

This connected environmentally-friendly agricultural robot is totally autonomous in crop maintenance. It works the ground to mechanically weed the soil, providing better water infiltration at the foot of the crop and optimising inputs.
At the same time, it analyses the soil and the crop in place to help with decision-making via a plot report.
As well as working the soil by hoeing, it collects crop monitoring data: presence of weeds, density and progress of the crop, luminosity, hygrometry and the temperature of the soil and the air.
Its purpose: to establish a cooperative process between man and machine to process this data and guide the farmer in his/her decisions.
It moves using a laser, camera and GPS guidance unit. Its electric motor means that it is environmentally-friendly (silent and no polluting emissions). Its progress can be monitored by connecting to your smartphone or tablet.
It is a combined solution for crop maintenance that both works the ground and processes indicators for sustainable agriculture.



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CLAAS

Cutter bar
Product trade name: Vario cutter bar

The new CLAAS VARIO cutter, by adjusting the distance between the saw and the screw, optimises the flow according to the harvest, adapting the length of the straw to reach the maximum flow with the combine harvester. The total run of the apron is 700 mm. The apron can be retracted by 100 mm for short crops and extended by 600 mm for oilseed rape, directly from the driving position. The cutter has a very simple sequence of events, with no conversion and no tools, for the entire run of the apron. This provides significant time savings for converting the cut between different crops, particularly the new constraints related to cereals and oilseed rape. Furthermore, changes to farm structures and the common purchase or joint-ownership purchase of combine harvesters justify the benefits of such a system. Unique in the market, this cutter also has an automated system for putting it in the transport position.

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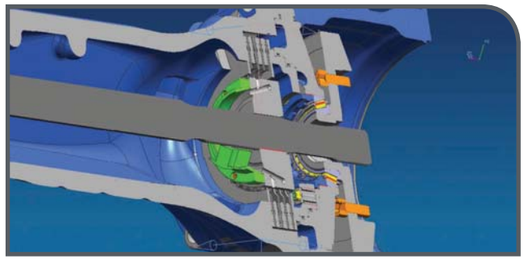
COMER INDUSTRIES

Solution to improve the efficiency of oil-bath brakes
Product trade name: Centriplus

Oil-bath brakes are generally used for service brakes and parking brakes. This approach has a disadvantage due to the speed of the disk rotation, which is normally high (up to 1,500 rpm). This causes movement and agitation of the oil, with energy dissipation and a high temperature.
After this technical solution, the brake unit is isolated by two counter-discs at the end and the brake discs are not immersed in the gear oil, which avoids heat dissipation due to friction. The lubrication of surfaces is necessary to the correct functioning of the brakes. It is ensured by a system that draws off the gear oil to control its access to the interior of the discs by centrifugal action (hence the name CENTRIPLUS). An opening in the separation system in the upper part of the axle lets the oil exit and recirculate. The system therefore remains lubricated and remains efficient in the braking phase.
A pump controls the draw-off of the gear oil towards the brake unit, thus cooling and lubricating the friction surfaces.
The solution is intended for self-driven agricultural machines equipped with internal oil-bath brakes, particularly telescopic lifts (telescopic arm loaders), also used for feeding cattle.



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HARDI-EVRARD

Application and tool for assistance with farm management
Product trade name: Evrard-ScanApp

The EVRARD-ScanApp is an application on smartphone and tablet that simplifies the data entry necessary for the mandatory tracking of phytopharmaceutical products used in each plot. It can scan their barcodes to identify them and manage communication with the REGULOR 6 terminal of the HARDI–EVRARD crop spraying machine via Wi-Fi. The data memorised in the embedded plot documentation file may subsequently be transmitted via an SD memory card to the plot management software at the farm's head office.
The system therefore improves reliability and simplifies the identification and entry of products used and makes use of the existence of barcodes giving access to all the information on the product used, both concerning its usage instructions and the risks that it entails for the user and his/her environment.

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HORSCH

Crop spraying machine
Product trade name: Leeb GS

The BoomControl Pro is a principle for stabilising and guiding the ramp. Its innovative aspect is that it associates a pivoting ramp frame assembly with active control of its position. The very great stability provided by the system allows the target to be approached as closely as possible. In this context, the LEEB GS provides nozzle gaps at 25 cm for optimal coverage at a low spraying height. This gap between nozzles combined with the great stability of the ramp can optimise the use of nozzles at 80°. This set of solutions can limit drift while working at a high speed.
The CCS rinsing system constantly rinses by backflow. This principle can reach the appropriate dilution very quickly, with a low requirement for fresh water. During rinsing, the fresh water is sent to the tank via a piston-membrane pump. Once in the tank, the fresh water drives the plant treatment mixture and the whole is immediately taken up by the centrifuge pump to be spread by the ramps.

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IFM ELECTRONIC

Intelligent 3-D sensor for mobile machinery
Product trade name: O3M

The 3-D sensor, fixed at the front or rear of the vehicle, can identify the position, size, trajectory and relative speed of about 20 objects in its field of vision (of 70° x 25°).
It uses the «flight time» principle with patented PMD technology (Photonic Mixer Device) offering a very great detection range (>35 metres). Thanks to additional LED lighting, the sensor functions perfectly both day and night, in full sunlight or with reflective materials.
A confidence indicator on each pixel ensures that the transmitted information is reliable. What is more, it includes auto-diagnostic functions (level of dirtiness, temperature, monitoring the lighting system,…) transmitted to the controller. Lastly, the mobile 3-D sensor is perfectly adapted to extreme environments: temperature range from -40° to +85°C, excellent resistance to shock and vibration, with a high protection index (IP69K).

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JOHN DEERE

System for sharing electricity between the farm, the tractor and tools
Product trade name: Battery Boost

The central element of the system is the Battery Boost Tractor, derived from the 6RE model. It is equipped with several AEF bi-directional sockets and a wiring harness allowing current to flow from and to the attached tool. The main innovation is the interchangeable battery connected to the front lift, which, statically, can be used as a buffer to the farm's production network, and which, connected to the tractor, transforms it into a hybrid tractor with interchangeable batteries.
This battery pack can, according to requirements:
- increase the autonomy of the tractor,
- supply additional power to its transmission,
- supply additional power directly to the tool, via the tractor's wiring harness (e.g.: trailers with electrically-driven axles). In certain cases, we can therefore temporarily double the power of the tractor-tool combination.

All of the components of the system are fitted with AEF sockets, giving it real Plug and Play functionality.

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LINDSAY EUROPE

Anti-puncture wheel, with no tyre or chamber for frontal irrigation pivot and ramp
Product trade name: NFTrax

The NFTrax wheel from Lindsay for frontal irrigation pivot or ramp combines the advantages of a metal wheel not subject to the risk of puncture with those of a tyre, for which the flexibility adapts to ground irregularities. These advantages avoid all of the problems, costs and time lost to maintenance, downtime and disruption of irrigation.
The NFTrax includes a wheel rim, a tread specially adapted for irrigation and an attachment system between these two components. The design of the tread, produced with a steel cable core and UV-resistant vulcanised rubber, associated with the design of the attachment parts at the edge of the wheel, fulfils the functions of a tyre but without air.
The structure of the tread, thanks to its shape and controlled flexion, is designed to maximise traction and minimise slipping and soil damage (creation of ruts) caused by the repeated passage of wheels. Furthermore, the lack of a sidewall, as on tyres, reduces the movement of earth in the track of the wheel.
The track is thus maintained in the best possible condition throughout the irrigation season.

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MAFERME-NEOTIC

Full web precision agriculture module
Product trade name: PreciZion

PreciZion is a module integrated with the current online plot management solutions, Agreo and Atland. It aims to simplify and increase communications with the precision-agriculture consoles equipping tractors. PreciZion functions as a bridge between machines and the plot management system and ensures that systems are interoperable transparently for the user.
The ergonomics have been designed to be the most efficient, intuitive and simple possible for farmers to use, fully integrated with their farm management solution.
Simple but efficient functionalities:

- Data export using a USB drive or wireless to the console in the ISOXML and other formats is firmly intended to be a simple solution, focused on the future. The export also concerns the repository and the tasks prepared by the farmer and checked at the regulatory level, as well as recommendations sent by his/her adviser.
- Importing completed tasks and associated maps makes best use of data, to take it into account in decisions that are strategic for the farm.

The data consultation and archiving aims to constitute a genuine database focused on «precision agriculture» for the farmer.

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McHale

Press-baler with plastic-film binding system
Product trade name: McHale Fusion 3 PLUS

The McHale Fusion 3 Plus press-baler uses a new binding system that can apply several layers of plastic film in the pressing chamber instead of string or thread.
When the bale is completely shaped in the pressing chamber, several layers of binding film are automatically applied instead of the traditional string or thread binding. The bale is then transferred to the baler part of the machine, which lets the operator continue harvesting.
The automatic process of binding then takes place and binds the bale consistently, with similar layer density on all sides of the bale (cylindrical part and the flat sides).
With this system, there is an increase in the density of bales and, above all, an improvement in the quality of fodder and it is better preserved because the air is expelled from the bale during pressing and the film that is applied then keeps the bale compact (no release).
Handling operations are easier, particularly for distribution because there is now only one product to be cut and then recycled.

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MERLO

Lateral and longitudinal machine stability control system
Product trade name: TSS - Merlo Transversal Stability System

The Merlo control system ensures the safety and lateral and rear stability of the telescopic loader. In order to ensure that the machine remains entirely stable (frontal longitudinal, rear lateral and longitudinal), the Merlo system is able to read, 100 times per second, all of the important parameters related to the stability of the machine, namely the load on each wheel, the position of the telescopic boom, the telescoping, the angle and load lifted, the inclination of the chassis and the recognition of the attachments on the telescopic boom.
The dedicated electronic unit analyses the information from all the sensors on board the machine and keeps the driver informed, using the display in the cab, concerning the stability of the machine in all directions.
The system constantly works out all the operational stability parameters of the Merlo telescopic appliance and intervenes, according to the type of problem detected, by warning the driver or possibly blocking the manoeuvres that would threaten the stability of the machine.

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MULLER ELEKTRONIK

Diagnostic tool for Isobus machines
Product trade name: InsightME

The InsightME application is an overall diagnostic concept that is based on a communications link established using a CAN/Wi-Fi interface. This allows a tablet or smartphone to be connected to the machine's CAN/ISO 11783 network and also allows the technician to communicate with the electronic modules. This application, developed to function on mobile equipment, can therefore display information coming directly from the machine without being physically connected to the CAN network. This mobile equipment, thanks to its 3G/4G connection, can also serve as a gateway to a remote service. This application allows the technician to easily diagnose the real cause of a technical breakdown.

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PERARD

Chaff recovery
Product trade name: VMP Pérard

Chaff is generally dispersed on the field after harvesting and is not recovered. However, the presence of weed seeds in the chaff raises the problem of their germination and regrowth. Recovery resolves the problem of weeds, while also saving time for the farmer and, through various reuse channels, provides additional income.
The VMP is fitted on the combine harvester just by screwing it onto the rear connection and likewise on a connection at the front left axle. The system quickly and easily adapts to various recent combine harvesters. For road transport, the VMP connects to the combine harvester's conveyor and folds in two.
The VMP system for harvesting and packaging chaff is automated (control electronics with console in the cab) and has its own power (integrated internal combustion engine).
The separate harvesting of this biomass opens up new outlets. Fine and light, chaff is litter that is particularly pleasant for poultry, dairy cows and lactating sows. Chaff that has served as litter is a good substrate for a methane producer because it is rich and easily transported. The compost that results from the fermentation process in a biogas unit can then be spread.

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RAZOL

System for guiding a harrowing machine by computer vision and centrimetric GPS
Product trade name: Agrogeovisio®

The AGROGEOVISIO® system associates guidance by vision and by centrimetric GPS to control a harrowing machine in all crop situations.
The harrowing machine is guided in the row using an intermediate three-point. This guidance can be done either by computer vision or by centrimetric GPS according to the state of coverage of the crop.
A data collection system constantly records the position and size of each plant in a dated database. This can monitor the vivacity of plants and automatically map and zone the plots, while performing the harrowing work or other operations using the intermediate three-point.
This system includes an innovative centrimetric GPS that provides centrimetric positioning without using RTK technology and for a cost that is much lower than the RTK GPS.

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Remorques ROLLAND

Easy connection system for trailers with auto-piloted axles
Product trade name: Roll-Link

The ROLL-LINK system allows a single person to easily and safely connect a vehicle of 2 or 3 axles equipped with auto-piloted rear or front/rear axles (in 3 axles). When connecting a 3-axle ROLLAND skip equipped with the ROLL-LINK system, the driver approaches the skip with the tractor, then connects it to the stud and makes the hydraulic connections. In order to easily connect the auto-pilot jacks to the axles, the driver unlocks the system to free the jacks and displaces them using the system's rotation possibilities. This additional displacement will let him/her very easily place the left and right jacks in the couplings fixed on the tractor for this purpose, and lock each stud with the aid of a pin. The driver can then get back in the cab and move forward with the skip. A manoeuvre towards the left, then the right lets him/her unlock the whole system and quickly begin his/her working day. The driver alone has safely carried out this manoeuvre, which currently requires 2 people and/or numerous ascents/descents to/from the tractor's cab.

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SULKY BUREL

Automatic adjustment of independent right and left sides on an Isobus centrifuge spreader
Product trade name: X40 fertiliser distributor - X50 Isobus

The fertiliser distributor functions using ISOBUS and the universal terminal (UT) including its task controller (TC) and more particularly, the TC-GEO function, is a John Deere 2630 Green Star interface. Using the ISOBUS protocol, the information module for the fertiliser distributor (machine ECU) sends the 12 sections that compose its layer of fertiliser to the task controller in the ISOBUS console in the form of an ISOXML file. This file assigns the left dispenser to sections 1 to 6 and the right dispenser to sections 7 to 12. The machine ECU is designed to send this type of file and the task controller is also developed to receive, read and resend the targeted doses for each of the two dispensers according to two virtual positions of the GPS aerial.
Until now, the automatic adjustment carried out from a recommendation map managed a single dose throughout the entire width. Automatic right / left adjustment using centrifuge spreading is one step further in precision agriculture.

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