



T1.12 PRECISION AGRICULTURE MACHINERY AND EQUIPMENT

What is this?

With modern agriculture *machinery* and technology nowadays, farming has improved more like a science than an art. The main purpose of using technology and *machinery* in agriculture is to improve *productivity*, *efficiency*, and sustainability.

Some additional information...

In recent decades, agricultural mechanisation has seen significant development, resulting in an increase in *efficiency* in the implementation of many activities and a substantial shortening of the terms for their performance.

Various types of modern agricultural *machinery* and technology are used in different agricultural operations nowadays.

Since the olden times, animals have been the primary source of energy when it comes to tough jobs in farming. Later on, steam power started replacing the animals, and then gas-powered tractors took over, followed by diesel engines and now – the first electrical engines. It caused a reduction in the number of workers on farms, but farm production continuously increased with the use of agricultural *machinery* and *equipment*.

The agricultural sector's key role in society and the development of science, techniques, and technology give impetus to the continued development of agricultural *equipment*. Farmers have modern *machinery* and *equipment* with innovative technologies through which basic agricultural operations such as tilling, moving, digging, weeding, mowing, harvesting, and others are performed quickly, easily, and efficiently. Four main types of agricultural *equipment* can be distinguished.

- **Cultivation *Equipment*:** *Equipment* is used to loosen and turn the soil, thus preparing it for planting. The *equipment* of these machines includes ploughs, harrows, and cultivators.
- **Tillage *Equipment*:** Machine tillage is aimed at cutting, breaking, and turning the soil to clean it and create a finer soil surface.
- **Harvesting *Equipment*:** These machines find application in harvesting the produced agricultural produce after reaching the optimum level of maturity.
- **Planting *equipment*:** The functions of this *equipment* are to prepare the soil for planting, to ensure the optimum spacing and amount of seed placed on the cultivated area, and to cover the seeds and firm the soil after sowing.



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Agricultural *equipment* can be divided into two main categories: agricultural vehicles and agricultural attachments, but in addition, there is also a group of heavy machines.

The first group (vehicles) includes:

- Tractors – this is one of the main agricultural machines with a wide application. Their main purpose is to tow other agricultural *equipment*. Their characteristics - size, power, etc. - vary widely in response to the different sizes and needs of holdings.



Source: <https://www.farmmachinerylocator.co.uk/>

- Combines and Harvesters – agricultural machines whose primary purpose is harvesting. They are actively used in grain production but also in other sectors. Like tractors, they have different sizes and performances.
- ATV or UTV – All-terrain vehicles or utility vehicles are designed to go faster over rough terrain. They are more compact than the previous two categories and, like tractors, can be equipped with various attachments.

The second group (*equipment*) consists of the following:

- Ploughs - The purpose of this *equipment* is to prepare the soil for subsequent treatment. They loosen and turn the soil, thus killing surface vegetation and preparing the soil for planting.
- Fertiliser Spreaders – These devices spread fertilisers across fields quickly and evenly.
- Harrows – Implements for stirring the soil, breaking up clods, and spreading crop residues, manure, and manure residues.
- Seeders - Machines through which the activity of sowing is mechanized. Their functions are related to the uniform and precise distribution of seeds over large areas, including creating beds and covering the seeds with soil.
- Balers – These tractor attachments collect the material and pack it into bales for easier transportation and storage. They are used to collect hay, cornstalks, and straw.
- Cultivators - These are machines designed for surface treatment of the soil without turning the layer. The goal is to maintain the surface soil layer in a loose state by destroying weeds and to provide optimal conditions for sowing or transplanting.



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- Transplanters - These are devices whose functions are: digging up plants from one area, digging holes, and replanting them in another.

It should be noted that the listed *equipment* is some of the most common, but it is not by any means a comprehensive list of all the agricultural *equipment* attachments available today.

The heavy construction *equipment* for farming covers skid steers, backhoes, dozers, excavators, and other *equipment* for earthmoving, maintenance, material transport, and more.

When it comes to agricultural *equipment* brands, the Top 10 usually includes Fendt, Claas, Amazone, Lemken, Horsch, Krone, Deutz-Fahr, New Holland, John Deere & Kuhn.

Concerning the top producers, John Deere, CNH Industrial N.V., AGCO Corporation, CLAAS KGaA mbH, Changzhou Dongfeng Agricultural Machinery Group Co., Ltd., Lovol Heavy Industry Co., Ltd., Changfa Agricultural Equipment Co., Ltd, YTO Group Corporation, SDF Group, Shandong Changlin Group should be noted in Top 10.

Precision agriculture offers tools that make it possible to get to know arable areas better, make management more efficient, and increase *productivity*.

To implement *precision* farming, at least a GPS capable of connecting to the computer, a sampler for soil collection, and software for map generation are needed. But, it would be better if farmers could count on *autonomous* and automated tractors, planters, harvesters, irrigation systems, and devices capable of identifying the presence of weeds and applying the herbicide only to them.

Autonomous tractors are already capable of carrying out the entire process of planting, harvesting, and applying pesticides practically without the need for pilots.

"Self-propelled" planters carry out the work without needing the tractor to pull them. Planting planning is carried out through digital platforms and has data collected from the plantation and inserted into the onboard computer of the agricultural *machinery*.

Automated irrigation systems help to increase production, reduce *costs*, and reduce environmental impacts.

Combine harvesters equipped with harvest monitors enable the operation to be carried out fully automated, selecting ripe fruits through *sensors* or respecting the ideal soil moisture.

Forklifts equipped with *sensors* allow farmers to monitor the entire warehouse flow in real-time, manage classification and traceability, avoid waste, and optimize *costs*.





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Robots are taking on many tasks in agriculture these days (with varying levels of success), including planting greenhouse crops and pruning vineyards. The most significant push has been for *autonomous* machines that are remotely controlled using telematics.

Drones are used to fly over areas and provide data on crop development, the existence of pests and failures, and levels of deforestation. They are also used to count plants, measure planting height, monitor the need for water and inputs, and spray only the points needed.

Software developed for data analysis can generate accurate maps to interpret what needs to be corrected in the field and allow more accurate *decisions*, reducing risks and minimising production *costs*.



Source: <https://www.farmmanagement.pro/5-practical-uses-for-drones-in-precision-farming/>

The data provided by Big Data – a term in English to designate a large amount of data – enables a better flow of information, making farmers more agile and effective in analysing, making *decisions*, and implementing strategies.

As can be seen, the new *equipment* used in *precision* agriculture has revolutionised the agricultural sector and has made it possible to achieve

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Links

<https://www.globalagtechinitiative.com/in-field-technologies/sensors/top-10-technologies-in-precision-agriculture-right-now/>

<https://www.cema-agri.org/precision-farming>

<https://dmcwearparts.com/types-of-agriculture-equipment/>

<https://www.fieldking.com/blogs/agriculture-machinery-and-their-uses/>

<https://www.agrifarming.in/precision-farming-tools-guide-for-beginners>

<https://www.robustec.ind.br/en/blog/equipment-needed-in-precision-farming/>

<https://dmcwearparts.com/types-heavy-equipment/>





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<https://www.marketresearchreports.com/blog/2020/09/01/top-10-agricultural-equipment-manufacturers-world>

<https://tractor.bg/novini/predpochitanite-ot-germantsite-marki-zemedelska-tehnika>

Video

<https://www.youtube.com/watch?v=Dx5SvIN1J40>

Keywords

Machinery

Equipment

Precision

Autonomous

Sensors

Decisions

Efficiency

Productivity

Costs

