

## SMART MAINTENANCE CONCEPT IN FARMING

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**Abstract.** The article considers the problem of the integration of advanced technologies into existing farming practices in order to increase production efficiency and the quality of agricultural products. It describes CMMS software (Computerized Maintenance Management System) as a technological innovation to help boost production and overcome the challenges of agriculture. Much attention is given to the main goal of maintenance software in farming.

**Keywords:** smart farming, maintenance techniques, computerized maintenance management system, artificial intelligence, reliable technical assistance.

Smart farming (SF) and precision agriculture (PA) involve the integration of advanced technologies into existing farming practices in order to increase production efficiency and the quality of agricultural products. As an added benefit, they also improve the quality of life for farm workers by reducing heavy labor and tedious tasks. Smart farming, based on the incorporation of information and communication technologies into machinery, equipment, and sensors in agricultural production systems, allows a large volume of data and information to be generated with progressive insertion of automation into the process.

Replacing human labor with automation is a growing trend across agriculture. Most aspects of farming are exceptionally labor-intensive, with much of that labor comprised of repetitive and standardized tasks – an ideal niche for robotics and automation [2].

We're already seeing agricultural robots (AgBots) beginning to appear on farms and performing tasks ranging from planting and watering, to harvesting and sorting. Eventually, this new wave of smart equipment will make it possible to produce more and higher quality food with less manpower.

The maintenance world is evolving just like anything else around us. New methods, processes, techniques and trends are constantly being developed, tested and implemented. Every company wants to produce as much product as possible, at the lowest cost, with the highest return, at the best efficiency rate and, of course, without running their assets to the ground.

As the agricultural sector turns towards new technologies and smart farming, maintenance becomes even more critical. Every day, farmers have to deal

with natural, economic and technical constraints knowing that the slightest setback can threaten the entire production. This industry relies on farming maintenance as well as scientific and technological innovations such as CMMS software (Computerized Maintenance Management System), to help boost production and overcome the challenges of agriculture.

Farming maintenance influences almost all aspects of farm work, whether it's the state of buildings and infrastructure, or the operation of machines and equipment. Modern farmers invest a lot of time and effort in ensuring that their farm tools and equipment are functioning properly during seasonal workload peaks. By adopting new maintenance routines inspired by the Industry 4.0, farmers can significantly improve the availability and reliability of all their machinery. And even though this may seem expensive or challenging, the final outcome is a more secure investment for the future. Guided by a smart CMMS for improved agriculture and farming maintenance, business owners will quickly find the right way to cut expenses, prevent breakdowns and streamline the entire maintenance process.

Industry 4.0 is often synonymous with artificial intelligence and machine learning. When it comes to farming maintenance, Industry 4.0 provides the means to store, process and analyze big data in order to simplify the creation of predictive algorithms and therefore provide more reliable technical assistance.

The influence of Industry 4.0 on farming is evidenced by an increasing use of sensors, robots and new technology to monitor crops and soil. Similarly, industry 4.0 maintenance software, such as next-gen CMMS software, simplifies data entry and processing in order to improve traceability and equipment-monitoring. The data helps professionals monitor their equipment in real time to speed up the detection of problems and shorten their reaction time. This way the malfunctioning equipment can be fixed before it damages the crops or causes significant delays [1].

Adopting new tools provides a great opportunity to optimize maintenance processes by shifting from a reactive to a proactive maintenance strategy. There are two very important conditions to successfully make this transition: adopting a versatile and user-friendly CMMS and establishing strong preventive maintenance routines.

The usability factor is of critical importance, since the market is flooded with hard to use CMMS solutions that require many hours of equipment migration and training. The main goal of maintenance software should be to support business owners and ease their daily routines, without making the integration of a new tool a burden for the whole team. A good CMMS features an intuitive interface and an easily understandable data analytics tool that every professional should be able to use without the need for IT-expertise.

Taking equipment maintenance in a new direction may still seem like a big leap to the business owners of small and middle-sized farms and agricultural establishments. But change doesn't have to come all at once. If you're still hesitant, you may

want to start with some small changes, for example eliminating paperwork and organizing your farm tools and equipment within a next-gen CMMS. Once your efficiency increases, you can try adding sensors to your equipment to see how the digitally transmitted signals can reflect the state of production equipment.

This technology can detect changes and faults that are invisible to the human eye. Through the use of sensors, your manufacturing process will become lean and transparent.

### References

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## MAINTENANCE PRACTICES FOR DIESEL ENGINE FILTRATION

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**Abstract.** The article describes the typical maintenance practices for diesel engine filtration. It highlights oil, fuel and air filters maintenance operations.

**Keywords:** maintenance, fuel filter, oil filter, air filter, contamination, proper filtration.

Dirt is the deadly enemy of a diesel engine, and it comes in many forms. Abrasive contaminants are literally everywhere in the environment. Some like small metal particles, grinding swarf and paint residues may be introduced or left in the engine when it's assembled. Fuel and lubricants are another often overlooked source of contamination. Water, either dissolved or in solution, is a serious concern with stored diesel fuel. Dirt and other particulates from many sources, including airborne dirt and dust that enter tanks through vents and breathers, are almost certainly present in any stored fuels and lubricants.

Of course, the air itself is far from clean in most of the places a diesel engine works. Dust and dirt are a commonplace on construction jobsites, farms, and even stationary engine locations.