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## **DIAGNOSIS OF CARS WITH THE HELP OF CLOUD TECHNOLOGY**

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Introduction. In modern conditions, such indicators of the efficiency of the agro-industrial complex (AIC), such as labor productivity, production volume, its possible losses, and much more, significantly depend on the technical condition of the fleet. One of the ways to eliminate difficulties and improve the organization of maintenance of trucks (toga) is to use cloud technology in the process of direct repair work.

The role of road transport in agriculture. Automobiles in agriculture are one of the main factors in increasing labor productivity. At the same time, the share of technical progress in improving cars accounts for 40 to 50% of the increase in labor productivity, and the remaining 50-60% is due to other factors.[1]

Road freight transport accounts for up to 80% of the volume of traffic. The priority development of road transport is explained by the significant average radius of cargo transportation, which is especially typical for the agricultural sector of Northern Kazakhstan, as well as the lower cost of road transport.[2]

Changes in the technical condition of units and components occur under the influence of constantly acting reasons due to the operation of mechanisms, random causes, as well as external conditions under which the car works or is stored. Accidental causes are caused by violation of rules and norms of normative and technical documentation (hidden defects and overloads of the structure exceeding the permissible limits, etc.).

The current state of agricultural transport is characterized by a low technical level, a strong deterioration of the rolling stock, and an unsatisfactory state of the production base. More than 30% of vehicles are operated beyond the standard service life, the rest is approaching this state. The downtime of automotive equipment due to failures and other technical reasons is up to 29% of their working time, the renewal of the car fleet is practically not conducted, and the residual resource of used cars does not exceed 15-25% of the original.

Insufficient security of agricultural producers of HA and the reduction of its technical level have a negative impact on the provision of transport services to agriculture. HA produced by the domestic automotive industry in terms of energy saturation, as well as technical and economic parameters (fuel efficiency) are significantly inferior to foreign counterparts. This does not allow to increase their productivity and reduce product losses, increases the cost of maintaining equipment in working condition [3].

Therefore, it is very relevant to work related to ensuring the efficiency of the aging fleet by finding measures to improve the performance of operations for their maintenance in conditions of its deficit. At the same time, the need to operate worn-

out and exhausted equipment creates a large additional load on the repair services of the agro-industrial complex. At the same time, the transfer of the main volumes of work to restore the performance of machines directly in the farms has led to a decrease in the quality of service due to the lack of appropriate production facilities, equipment and insufficient skills of employees.

In improving the quality of operation of agricultural trucks, rational use of their resources, timely detection and prevention of failures, a large role belongs to the AND so on. The problem of managing the technical condition of the machine can only be solved by improving the methods and means of maintenance.

Cloud technologies (or cloud computing) are technologies for distributed processing of digital data, through which computer resources are provided to the Internet user as an online service. The programs start and display their results in a web browser window on the local PC. All necessary for work apps and their data reside on the remote Internet server and temporarily cached on the client side: PC, game consoles, laptops, smartphones. technology Advantage that the user has access to their own data, but do not have to worry about infrastructure, operating system and software with which he works. The word "cloud" is a metaphor for a complex infrastructure that hides all the technical details. Cloud computing technologies are aimed at solving the following tasks:

1. Convenient work with files on multiple gadgets: editing and processing them without transferring from one device to another, without having to worry about software compatibility.
2. Solve the problem of limited hard disk space on your computer or flash card.
3. Question the licensed software.
4. The ability to simultaneously work on the same document to multiple people. [4]

#### Service model

Software as a service (SaaS) is a model in which a consumer uses a vendor's application software that runs in a cloud infrastructure and is available for variety devices either a browser or a program. The provider manages servers, the main physical or virtual cloud infrastructure, including the operating systems, storage, network or individual application functions

Platform as a service (PaaS) is a model that allows consumers to use the cloud infrastructure to host basic software in order to host new or existing applications on it. These platforms have tools for creating, testing, and executing application software-database management systems, linking software, and programming language runtime environments provided by a cloud provider.

The main physical and virtual infrastructure of the cloud, including the network, servers, operating systems, and storage, is controlled and managed by the cloud provider, with the exception of developed or installed applications, as well as, if possible, configuration parameters of the environment (platform).

Infrastructure - as-a-service (IaaS) provides the ability to use the cloud infrastructure for self-storage, processing, and management of networks and other computing resources.[5]

#### Cloud-based vehicle diagnostics

In 2011, manufacturer recalled 21 million vehicles. the manufacturer revoke cars of the same year , make or model only after the problem turns out to be serial. This requires sufficient time, during which critical systems can fail and pose a threat to drivers and strike a blow to the manufacturer's name.

As well as car control modules contain millions of lines of code, and the number of diagnostic trouble codes (DTC) often does not exceed tens. Therefore, it becomes necessary to systematically diagnose the software of car control systems in order to detect problems in advance.

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For the same reason, an automatic program for remote testing and diagnostics is being developed that can forward fixes for the firmware of the machine's control electronic components. Thus, the program acts as an intermediary between the vehicle's control modules and the remote diagnostics center (RDC).

The remote diagnostics center receives vehicle status data and prepares dynamic fault diagnosis codes (DyDTC) that are used. When all the information about the problem is collected, code is created for the controller.

In this way, the remote diagnostics system can detect and reprogram controllers with system errors.

By accessing the vehicle's electronics, the program generates vehicle health reports and detects minor faults, helping to prevent the problem before it manifests.

It is based on OBD2 protocols that are responsible for data exchange between the diagnostic scanner and the electronic control unit, and OEM protocols that allow you to extract more detailed information. The program can connect to any electronic control unit and collect its indicators: the condition of the air conditioner, airbags, transmission, engine, and so on.

The program uses the standard VCI (Vehicle Communication Interface) interface to connect to the vehicle diagnostics connector.

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