Information technology for evaluation works of machine aggregates

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Introduction

Existing methods of calculating of productivity, economic and performance indicators of machines were developed mainly at the beginning of the last century and applied to machines and technologies of that time.

The application of modern technologies for the production of crop products in combination with the latest designs of machines require improvement of the method of evaluation of the quality of their work using modern means of mathematical processing.

The parameters of the working parts of the machines must be appropriate to the needs of the plants and the soil and climatic conditions of the area where they are used.

The aim of this article is to investigate the efficiency of using a machine aggregate in terms of productivity, economics and quality.

Methods

Modern information technology methods make it possible to significantly simplify and reduce the cost of evaluating the performance of machine aggregates.

Decisive in this situation is the tool through which data is obtained for processing, analysis and decision making. It is a technique used to obtain information. The result of the calculation obtained in the laboratory shall be consistent with the result of the timekeeping observations in the production conditions. This is the kind of mathematical model we have developed and the computer program "Machine aggregate", the algorithm of which is implemented in Microsoft Office Excel.

The basic condition for calculations should be a reliable database.

Results

The input parameters for the study of the tractor are: brand, manufacturer, type of power tool, main technological parameter of power tool, engine power, specific fuel consumption, operating mass, balance value, standard annual load, reliability factor.

Output parameters: traction effort on the hook, fuel and lubricant costs, depreciation, compliance with agro-requirements.

The input parameters for agricultural machine research are: brand of machine, type of machine, basic technological parameter, maximum allowable agro-requirements speed, PTO shaft power, machine operating mass, carrying amount of agricultural machine, standard annual load of agricultural machine, system of maintenance and repair, number of personnel, kinematic length of the machine, coefficietnt of reliability of the machine.

The output parameters for agricultural machine research: total machine resistance, depreciation, coefficient of conformity to agrotechnical requirements.

The input parameters for machine aggregate research: coefficient of movement resistance, permissible operating speed of the aggregate according to agro-requirements, coupling coefficient of the driving apparatus, tangential thrust, coupling force, rolling resistance, driving force.

The output parameters for machine aggregate research: traction power, power loss due to slip, actual machine speed, power loss by rolling, power utilization coefficient, conformity with agrotechnical requirements.

Additional information is required to obtain economic indicators. Therefore, the methodology is supplemented by the following background data: remuneration, price guide, cost of services, hourly rates, traffic speeds and fuel costs at crossings, soil class by resistivity and others.

Discussion

Each machine aggregate, according to working conditions, has its own technological and technical indicators. For example, the operational and economic performance of the tiller aggregate will be significantly influenced by the physical and mechanical composition of the soil, and the mechanical and technological properties of the crop will have a significant impact on the performance of the combine. Given this fact, several approaches have been developed to determine the performance of machine aggregate. In the methodology, these groups of machines are divided into categories: arable aggregate, simple aggregate, multi-machine aggregate, self-propelled harvesting aggregate, trailed harvesting aggregate, cars.

According to the results of the conducted researches we get the result, which is divided into two components: operational and economic indicators and performance indicators of the machine aggregate. Each result includes technical and technological indicators, due to the machine's structural features, technological requirements and operating conditions of the machine aggregate. Based on relevant data, the result of the research is formed.

Conclusion

Easy energy access is a trigger for development,

The developed methodology allows to perform a deep analysis of the operational-economic and qualitative indicators of the use of machine aggregate in any natural and climatic conditions for both existing and projected aggregates.

Acknowledgement

Picture 1: Fulfilling of medium-scale BGP

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