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Issues of Modernization of Mechanical Engineering on Innovative Basis

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Annotation: This article analyzes the issue of modernization of mechanical engineering, which implies development on an innovative basis in the context of the transformation of industrial and economic relations, characterized by high dynamics of all scientific and technological processes.

Key words: modernization, road construction machines, mechanical engineering, road earthmoving machines.

Introduction

One of the main tasks of mechanical engineering at the moment is its modernization. The modernization of mechanical engineering implies development on an innovative basis in the context of the transformation of industrial and economic relations, characterized by high dynamics of all scientific and technological processes. This includes the search for fundamentally new energy-saving technologies and the integration of the best practices of the world's leading countries into domestic production.

However, the realities of our time clearly reflect the unsatisfactory foundations of the theoretical and methodological framework and the lack of an integrated approach in the search for effective tools to influence the development process. The formation of the theoretical basis of the tools for managing the sustainable development of scientific and technological systems in improving the reliability and durability of the hydraulic drive of a road construction machine is a significant scientific and practical task. Qualitative modeling of the formula for increasing the energy efficiency of the hydraulic drive is likely with a complex impact on organizational and technological systems, it will allow considering operating conditions, interpreting the process of energy efficiency of the hydraulic drive of earthmoving machines, mathematical modeling of the dynamic processes of the hydraulic drive, the methodology for substantiating the optimal parameters of earthmoving machines, etc. Based on this, it is possible to form adequate effective actions that affect the rhythmic development.

Main Part

The scientific problem is the need for a scientific and methodological basis for improving existing control systems for a single-bucket excavator to ensure efficient distribution of power among its main elements, considering system connections, which will minimize time and energy costs, increase machine productivity.

The structure of the proposed system is formed as follows. The transformation of problems into goals, due to objectivity and relevance, is currently the input of the management system for the research methodology of the processes of increasing the energy efficiency of machines. Undoubtedly, this area is diverse in many positions (climatic, constructive, operational, technological, in terms of the availability of labor resources, as well as the level of development of the scientific sphere, etc.). This means that the more detailed the stage of the controlled subsystem is studied, the deeper the differentiation of the total potential for increasing the energy efficiency of the hydraulic drive, and the less possible its identification.

Taken together, energy efficiency, patterns of dynamic processes, performance, technologies for reducing the energy intensity of excavation cycle cycles are a controlled subsystem, the consistency of which will be affected by the hypothesis put forward, the goal set, and the formulated research tasks (control subsystem).

It also describes the main conditions for the viability of a controlled subsystem and reflects the primary factors for the stable formation of these systems [21,22,23]. Analytical research, mathematical modeling of processes and methodology of processes determine the conditions for formation, based on the complex knowledge of the methodological concept. Only these directions can modify the structure and principle of decision-making at the first (interpretation of the process of changing the energy intensity of the excavation cycle of earth-moving machines), the second (development of a mathematical model of dynamic processes) and the third (methodology for improving energy efficiency) stages of research.

Sustainable development implies a qualitative adaptation of mathematical models to real operation processes and the development of a scientifically based methodology for substantiating the optimal parameters of an effective drive (ED) of earthmoving machines. The adaptation of mathematical models to real operation processes and the determination of the optimal parameters of the EP must be controlled in order to have objective information about the factors affecting them to varying degrees. Therefore, a holistic information array that allows developing a set of practical recommendations, implementing them and analyzing the results obtained is an important element of the system. Based on the results of the analysis of the obtained data, it is possible to estimate the level of energy consumption and durability of the entire hydraulic drive as a system (system output) [1,2,11].

The key element of the information array will be the interpretation of the process of changing the energy intensity of the excavation cycle of earth-moving machines from the point of view of mathematical models. According to a number of authors [3,4,5,6,7,8,9], the interpretation of processes should be studied from the standpoint of the adaptation of mathematical models to real processes of operation and energy efficiency of the hydraulic drive [10,11,12,13,14].

A well-organized system of monitoring and evaluation of the mathematical apparatus for studying the processes and patterns of the dynamic processes of the hydraulic drive will more effectively form tasks that require special participation of the researcher at all stages. Based on the data obtained, it will be possible to make effective management decisions, to form a list of activities that will change the conditions (prerequisites) for the functioning of the controlled subsystem towards the mathematical model of research. Given the above, the described system has such indicators as unity, structural organization, purposefulness. Note that the theoretical assumption about the use of an integrated approach to the creation of the logical-structural scheme of the study is significant and justified [15,16,17,18,19,20].

The implementation of the model of mathematical description of the priority research process (energy efficiency) is consistent with a holistic variation of the elements of the mathematical apparatus. The solution of a complex of problems, considering systemic connections, is possible with a systematic approach to considering the effectiveness of the process.

Conclusion

An integrated approach as one of the priority conceptual principles of scientific research made it possible to determine and adapt the main subsystems and its components, interaction, goals and functions, develop a logical and structural block diagram of the control system by studying the processes of changing the energy intensity of the excavation cycle cycles of earthmoving machines and increasing their energy efficiency.

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