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RESEARCH WORK DEPARTMENT CONSTRUCTION MACHINES

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The basic directions and results of research department construction machinery.

Science, research, machinery, construction.

Problem. Recently, there has been a downward trend in the level of scientific research conducted in the laboratories of the departments in higher education and, consequently, reduced qualification of future teachers, affecting the quality of training engineers.

Therefore, the necessary conditions for the preparation of highly qualified scientific and teaching staff is one of the primary goals of the research departments of universities focus.

Analysis of recent research. There are several reasons that lead to the reduction of scientific research, among which are the lack of research funding, lack of modern equipment in the laboratory of others. However, the main reason in our opinion insufficient level of academic and teaching staff is the absence in many departments of supervisors, which serve the interests of science and education. Continuously improve the scientific level, along with graduate students and young professors conduct research. They know how to put scientific issues and problems and solve them together young researchers. In this approach, the conditions for creativity and a desire to work to solve important scientific, educational and industrial problems.

The purpose of research. To analyze the research work of the department and outline prospects for further research.

Results. The main scientific themes of the department is the optimization of the movement mechanisms and machines [1.2] for examples of handling trucks and other vehicles used in construction and agricultural production. The choice of optimal modes of motion of mechanisms and machines leads to a significant reduction of dynamic loads acting on the working bodies of machines and their elements. This minimizes fluctuations in individual units and as a result, increased

performance and reliability of the machines as well as improving the conditions of safe operation.

In optimization movement mechanisms and machines most important issue is to develop criteria for evaluation of dynamic motion. A

group of researchers developed criteria for evaluating integrated dynamic movement mechanisms and machines [3-5], which make it possible to assess the dynamics of mechanisms and machines for different purposes. Criteria are presented as integral functionals, where the integrand functions used different measures motion, kinetic and potential energy, and energy accelerations first, second and higher orders.

With optimization of motion is required to construct models of dynamics of mechanisms and machines, to this end, the mathematical model of the plane motion of a mechanical system [6, 7], which is built on the basis of universal models of specific mechanisms and machines such as crane boom hinge-jointed system [8].

On the basis of theoretical propositions solved a number of specific problems of optimization of traffic load [9-11] and construction [12,13] machines as well as robotic manipulation systems [14,15].

With the developed technique of optimization movement mechanisms and machines made a number of dissertations:

1. Demidas SV "Minimization of dynamic loads in elements of tower crane based optimization mechanism for lifting motion mode [16]. The author examined the causes of fluctuations in cargo cranes and steel structures. The measures reduce the dynamic loads on elements of the crane. The use of optimum mode ryvkovoho start when lifting cargo made it possible to reduce the amplitude value fluctuations efforts in the cargo rope and attaching arrows rozchali 1.9 times, and the metal boom 2.1 times compared to existing methods start.

2. Dushanin JS "Optimization of sustainable regime change departure balancing hinge-articulated jib crane system [17]. In the thesis the optimization criterion on which made optimization of energy balancing regime change departure boom system. Comparison of actual and optimal modes change departure shows that the first maximum deviation from the average kinetic energy values exceeding 1.9 times, while in the second case, the difference is less than 1%. This mode makes it possible to change departure minimize energy costs and the effect of dynamic loads.

3. Korobko MM "Justification of parameters and modes of motion rod conveyors beet machines [18]. The proposed feasibility of controlled systems start rod conveyors. The effect of treatment on the conveyor start value of dynamic loads in traction and organ damage roots. Optimal start conveyor allows 1.8-2.2 times to reduce the effect of dynamic loads in traction authority over existing modes start and poshkodzhuvanist Root decreased to 1.4-1.6 times.

4. Rohatyn OR "Justification load and designs of screw conveyors [19]. A direct proportional relationship between the axial component of

the flow velocity and angular velocity load auger vertical screw conveyor and optimum parameters of high-speed screw conveyor. It is shown that the minimum possible level of energy intensity is determined only by the coefficient of sliding friction load on the surface of the screw. The energy of the optimal parameters line in 1,3-1,9 times less energy intensity of conveyors recommended normative parameters.

5. Rybalko V. "Justification structural and technological parameters of devices for trimming hooves of cattle" [20]. The effect of excess hoof horn on load distribution between the bearing surface and determined the value of the limit angle shift reference plane hooves, which should not exceed 14 °. The optimum tool design and process parameters cutting biological material, depending on its physical and mechanical properties. The design of the device for trimming hooves in modern storage conditions of animals whose design allows for adjusting cutting mode depending on the properties kopyttsevoho horns and hooves geometrical parameters.

6. Kidney KI "Development and analysis of a roller molding installation with rekuperatsiynym drive." The principle of the design and installation of roller molding rekuperatsiynym drive, which allows the redistribution of cars during molding bezperervnyhpuskohalmivnyh modes of motion, leading to a reduction in energy costs by 40% compared to existing designs molding plants. The optimum angle offset crank $\Delta\varphi = 90$ ° drive mechanism by which reduced to a minimum energy consumption and reduced dynamic factor of 3.5 times, and the rate of uneven movement of 2.6 times.

7. Romasevych YO "Optimization of transient modes of freight bogie span cranes" [22]. Done optimization of transient states of motion crane trolley which eliminates vibrations cargo mounted on a flexible suspension and reduce the dynamic loading mechanism to drive the cart. Based on the research recommendations on the implementation of laws optimal traffic control trolley as mechatronic systems using frequency controlled drive mechanism. This control system has allowed to increase by 35-40% productivity performance of transport operations and to reduce energy consumption 15% of the drive mechanism.

8. Shimko LS "Justification of parameters and modes of the discharge device combines" [23]. Studied the technological process of moving grain from storage bins in vehicles. The optimum parameters and modes dumping hopper Harvester. Established average value of the velocity of the flow of grain material, which is recommended to take 0.25 m / s. Variation solved the problem of grain movement, resulting in definite mode of movement of the bunker, which provides a minimum time of discharge and set to the optimal design parameters vygruznogo tray.

9. Kulik VP "Justification of parameters of drive mechanisms reshitnyh states winnowing machines" [24]. The mathematical model of motion along the grain material old oscillating sieve considering friction force and nature of change, making it possible to determine the parameters of oscillations (frequency and amplitude), which provide the highest average speed of the grain material during separation. In the task defined as the law of motion of the grain material that provides minimal trauma fracture and grain. Developed dvoreshitna and tryreshitna cleaning machines that reduce to a minimum energy cost. The optimal value of the offset crank angles: in the first case, 90 °, and the second - 120 °.

10. DO Mishchuk "Optimization of changing departure with hydraulic manipulator on the vehicle." The optimal modes of motion of the manipulator, characterized by smooth movement of the boom system and minimum dynamic loads. In areas transients dynamic load decreased by 35-48% compared with the existing structure of the manipulator. The system of hydraulic control to implement the optimal modes of motion, which provides the desired feed the variation of the working fluid to the actuators. In this control mode oscillations are eliminated Drivers gripper with a load.

11. Shumilov GV "Optimization of regime change and departure lifting crane." A dynamic analysis of transients in the mechanisms of recovery and change flight cargo crane on which set causes oscillatory processes in the mechanisms. On the basis of the solution of variational problems of the optimal modes of motion mechanisms for lifting and cargo flight changes that eliminate fluctuations in load and hardware elements to the end of the transition. Under optimal modes of motion mechanisms efforts rope crane lifting mechanism decreased in 2,1-2,3 times and efforts towing rope change mechanism departure 5,7-6,8 times in comparison with manual control these mechanisms.

12. Palamarchuk DA "Optimization of traffic hinge-articulated jib crane system with horizontal movement of cargo."

13.

All the above thesis work presents theoretical studies on mathematical models and optimization of traffic carried or design and operational parameters. This approach makes it possible to analyze the full-scale operation mechanisms and structures and to identify their most rational or optimal regime and structural characteristics. In addition, all the theoretical characteristics tested by experimental studies on physical models or actual mechanisms and machines with modern measuring equipment connecting to computer technology.

Recently, important to the management of computer machines and mechanisms, ie a so-called mechatronic systems. Almost all work related

to the optimization of traffic mechanisms and machines create end mechatronic systems.

For a work of mechatronic systems master student studying the field of "Agricultural Engineering", "Machinery and equipment agriculture" and "Forestry Machines» read courses in mechatronics. For the course "Mechatronics" at the department is necessary material resources because all physical models of mechanisms and machines that are created graduate, represented as mechatronic systems. In addition, the Department issued a manual "Mechatronics" [29].

To learn the methods of optimization master student specialty "Machinery and equipment agriculture" also reads the course "Optimization of structures of technical systems" [30].

Recently, research on optimization of motion machines were further developed, which are presented in a number of monographs [31-35].

Conclusions

Almost all scientific research conducted at the Department relating to the handling machines used in construction and agricultural production. However, much of the agricultural machine incorporates a mechanism related to transportation or overload of agricultural goods, it would be advisable in the future to investigate precisely this class of machines.

The use of mechatronic systems with pre-optimization of traffic as part of agricultural machines will enable them to increase productivity and reliability, as Research Department should be directed in the direction of movement mechanisms optimization of agricultural machines and use them mehatronnyhsystem control.

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Pryvedeny direction and Main Results issledovatel`skoe scientific work of the department konstruyrovanyya machines.

Science, Studies, Machines, development.

The basic directions and results of research department of designing cars.

Science, research, machine, working.

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BASIC STEPS RESEARCH DEPARTMENT OF TRANSPORT AND TECHNOLOGIES In APC