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ERGONOMICAL APPROACH OF PROJECTING CONTROL AND MANAGE ORGANS OF FORESTRY MACHINES

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The paper summarizes the components of the system analysis of various engineering products to identify design solutions matching the requirements of the "human factor", revealed the relationship of "man-machine" for generalization and systematization of methodological principles of ergonomic analysis system.

Summary: General parts of systematic analyses different goods of machine building for finding human factor and connections "man-machine" for systematization of methodical principles of carrying out ergonomic analysis system «man-machine» In the design of a variety of industrial products and machines must be taken into account technical and economic requirements ("engine factor") and the requirements of the person as an individual (the "human factor"). Studying the physiological properties of human and anthropometric data and generating on this basis scientific advice for practical use in the design process improved product ergonomics acts as a natural scientific basis for artistic design. The optimal solution of problems related to the ergonomics ergonomic analysis, in which determine the degree of coordination of the structural and functional characteristics of products and the working environment with the capabilities of the human body. The aim of the study is to reveal the essence and objectives of the ergonomic analysis of the product at all stages of development (technical specification, schematic, technical and detailed design) for quantitative and qualitative assessment of the fitness machines to humans. Studies conducted on the subject K. Ioganek [3, s. 324] and D.Shmidt [2, p. 126], affecting some of the principles of ergonomic analysis in the "man-machine", except for matters of compliance requirements of the design decisions of the "human factor". An analysis of human action. 1. The estimated posture of the operator and its changes: the position of the body of the operator during standing (straight, lean forward, sideways), the presence of foot controls, the frequency and duration of their use (static component of the work); the possibility of arbitrary alternation of postures (standing, sitting); posture of the operator sitting at work (ease posture, seat settings, sizes and backrest angle, seat cushion, the height above the floor); the need to adjust your chair; upholstery, the existence and nature of cushioning devices anthropometric line space, the presence, shape and dimensions of the chair armrests. 2. It appears expedient distribution of movements of arms and legs of the operator in the "man -

machine". 3. It turns matching labor movements of the operator anatomical and physiological structure of the body. An analysis of the control system. 1. Study the purpose, frequency of use, accommodation to suit reach areas; review of operator controls the main directions of movement controls; corresponding to the shape and amplitude of motion in the joints of the person to which the main burden falls consistency controls movement arrow indicators and manage the machine. 2. The force applied to the controls, and revealed that their optimum and maximum allowable values given frequent use and the need for servomechanisms. 3. Set the presence of fixing controls in certain positions; legibility of the individual controls for color, shape, movement inscriptions placement mode of action; easy control for gripping and fixing; exclusion of the possibility of injury and limb deformities operator. 4. Estimated occupancy inscriptions regarding the controls. The analysis of monitoring and alarm systems. 1. Defines the types of display (acoustic, visual, tactile). 2. Set the availability of devices of alarms; means an alarm; placing it in areas that are convenient for perception; for sensing the presence of interference signals (noise, etc.). 3. Measure the angle of the instrument panel to the visual line; estimated occupancy inscriptions relating to the organs of control and signaling. 4. We give ergonomic characteristics of the instrument (the form and scale of its compliance with the required accuracy of readings, performance of the inscriptions on the scales - the clarity of the outlines of letters and numbers, their readability, contrast with the background, the color scheme of indicators - selection of the best, warning, danger zones mode, matching movement arrow indicator direction of motion of machine parts or controls). 5. Verify compliance with the principles of functional significance, frequency and consistency of use when linking the indicators and controls. 6. Determines the shape of the relationship between operators and the need for communication between them using the devices. Key issues of ergonomics, direct contact with the artistic design are visual perception, the anthropometric data and biomechanics.[1]. The above material is synthesized from many literary sources makes it possible to create in each case the complex requirements of the "human factor", which shall be accounted for in the design of industrial products. For the examination of the finished product, such as ergonomic analysis of the prototype, in most cases you can find the criteria for the evaluation of the test side product quality and workplace.

Modern engineering has reached a significant development, particularly in the forestry sector. Forestry equipment type "Forwarding" equipped with hydraulic volumetric transmission. These machines contain a large number of hydro units are constantly working in adverse conditions, contributing to their rapid deterioration and subsequent release of their down [1].

According to numerous studies found that 80% of failures in the mobile machines account for the fate of hydraulic [2]. The most expensive and crucial performance units forwarders hydraulic pumps and motors. The most widely used forwarders found pumps with adjustable sloping drive and unregulated motors with a sloping drive. The manufacturer of this class hydraulic machines are leading company «Eaton» (USA).

An analysis of defects hydromachines OSD, the main process that lead them to disability should be considered processes of wear pumping unit, but rather the working surfaces of pistons and sleeves cylinder (piston steam), end surfaces of the distributor and ladders bottom (distribution pair), and Surface fifth - support [1, 2].

During the operation OSD as the deterioration of working surfaces pumping unit increased gaps in pairs of friction and reduced injection pressure, leading to a decrease in volume and total coefficient of performance (COP) and forwarders, consequently, to a decrease in their performance [2, 3].

The purpose of the work. The aim of this work is to study the impact factor of the pump and the hydraulic motor volumetric efficiency OSD forwarders its performance.

Productivity forwarder in general can be represented by the formula.

Taking all the above parameters constant except dependence and obtain performance forwarders factor and the pump volumetric efficiency of the hydraulic motor.

Dependence forwarders factor productivity the pump and volumetric efficiency of hydraulic motor volumetric hydraulic transmission.

Analysis of the relationship in the figure shows that the reduction in the feed pump and hydraulic motor volumetric efficiency decreases productivity Forwarding, whose value reaches 11% at the maximum allowable state of hydraulic machines.

Conclusions. Forestry equipment type "Forwarders" equipped with OSD. These machines have a complex structure and contain a large number of hydro units are constantly working in adverse conditions, contributing to the rapid deterioration and subsequent release them down. Theoretical study of the effect of technical condition of transmission performance show forwarder reduce machine productivity by 21% while achieving maximum permissible OSD state. For efficient operation forwarder is necessary to timely control to prevent heavy wear and, consequently, reduce its performance.

List of literature

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2. Shmidt K. Ergonomic projecting: methods and parameters, Geoma, 134 p.
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Анотація

**ЕРГОНОМІЧНИЙ ПІДХІД ДО ПРОЕКТУВАННЯ ОРГАНІВ
КОНТРОЛЮ І УПРАВЛІННЯ ЛІСОВИХ МАШИН**

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В дослідженні розкриваються загальні теоретичні та регіональні особливості проектування машин лісотехнічного комплексу в Канаді.

З урахуванням ергономічних вимог до подібного проектування. Маючи досить суворі кліматичні умови в деякі регіони Канади потребують використання певних специфічних матеріалів властивості яких та порівняльні характеристики із звичайними наводяться в статті.