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FEATURES OF TECHNOLOGICAL CALCULATIONS FOR A MOTOR TRANSPORT ENTERPRISE

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Problem statement. The post-war recovery of Ukraine's economy will inevitably include technical re-equipment and the development of the production and technical base of motor transport. An essential role in achieving this goal is assigned to the theory, methodology, and practice of designing motor transport enterprises (MTEs). This includes reconstructing the existing base to improve the utilization of available production areas. This reconstruction should be achieved through advanced forms and methods of technical maintenance (TM) and current repairs (CR) of vehicles, increasing the level of mechanization of production processes, using modern diagnostic tools for assessing vehicle technical condition, applying scientific labor organization, and employing the most rational planning solutions from technological and economic perspectives for enterprise subdivisions.

Main research materials. The design of an MTE is based on project decisions regarding production technology and organization, TM, and CR of vehicles developed during the enterprise's technological design process.

The general structure of technological calculation includes the following stages [1]:

- selectingand justifying the initial data for organizing TM and CR of vehicles, as well as for projects of reconstructing and expanding individual production units or enterprises as a whole;
- calculating the annual production program for TM and CR of the vehicle fleet;
- determining the number of repair and maintenance workers and their distribution by work objects, specializations, and shifts;

- selecting methods and justifying the technology of TM and CR considering scientific production and labor organization recommendations;
- selecting technological and auxiliary equipment and justifying the degree of production mechanization;
- calculating the number of workstations, conveyor lines, and required areas for zones of daily maintenance, TM-1, TM-2, and CR of the vehicle fleet;
- calculating the areas of production units, warehouses, household, and administrative premises;
- selecting the main structural parameters of buildings;
- developing layout or volume-planning solutions for buildings and the enterprise's general plan;
- providing a techno-economic justification for the decisions made in technology, production organization, and reconstruction or construction of the MTE.

The results of technological design form the basis for developing other parts of the project (construction, sanitary, electrical, etc.) and largely determine the project's overall quality.

For maintaining vehicle operability and improving transport efficiency, a developed and effectively functioning auto-service enterprise infrastructure is required. The auto-service network should include branded auto centers, dealer centers, independent technical maintenance stations for vehicles that comprehensively perform all types of TM and repairs, as well as narrowly specialized enterprises.

One challenge in the operation of the auto-service network is the high load on some centers and insufficient demand for others. This largely relates to the validity of parameter selection during design or reconstruction. Such parameters include the number of TM and CR posts, room areas, the number of production and auxiliary workers, etc., typically determined during the technological calculation of the enterprise.

Different methods for technological calculation of auto-service enterprises exist: aggregated methods, deterministic methods, and economic-probabilistic methods.

The main advantage of *the aggregated calculation method* is the ability to determine general enterprise characteristics with minimal input data and without complex calculations. However, the accuracy of this method is extremely low, limiting its application to preliminary parameter evaluations.

The deterministic calculation method is widely used and is based on the requirements and recommendations of technological design norms (RRTD), which provide necessary reference information. However, for their application in modern conditions, it is essential to develop recommendations for methodology adjustments.

Results of technological calculations using the RRTD methodology significantly differ from functioning enterprise parameters, particularly

regarding the number of TM and CR posts, washing-cleaning posts, and enterprise workforce numbers. These deviations are due to high normative mileage intervals between TM, significantly reduced labor intensity of modern vehicle repair and maintenance, and the practice of replacing worn-out parts with new ones without restoring the old ones.

These characteristics suggest that the described technological calculation methodology requires adjustments in normative mileage intervals and labor intensity standards for TM and CR. Additionally, calculating the volume of CR work is complicated by the variability in vehicle repair arrivals and repair duration. Calculation accuracy can be enhanced by separately determining TM and CR work volumes.

An improved methodology for calculating TM stations of a comprehensive type should include [2]:

1) calculating the TM workload based on normative mileage and labor intensity of TM actions using the formula:

$$T_i = t_i \cdot N_i , \quad (1)$$

where t_i – specific labor intensity of maintenance, in person-hours;

N_i – Maintenance work program, in units.

2) calculating the CR workload based on statistical data on vehicle system failures related to mileage using:

$$T_{CR} = t_{CR} \cdot L_{CR} / 1000, \quad (2)$$

where t_{CR} – specific labor intensity of repair work, in person-hours per 1000 km.;

L_{CR} – average annual mileage of serviced vehicles, in kilometers.

The proposed division also requires correcting the shares of individual types of work in the total volume. Subsequent determinations of workforce needs, TM and CR posts, and production and warehouse space areas can be conducted using traditional methodology.

The economic-probabilistic method for evaluating efficiency and optimizing capacity has several advantages over the deterministic method. It considers the impact of the efficiency of technical resource utilization on the techno-economic indicators of the MTE, including staff work modes, labor and production organization options, production process stochasticity, the degree of aggregate repair method utilization, etc. This enables the search for optimization solutions. Using probabilistic mathematical models, it is possible to calculate techno-economic indicators of an MTE's technical resources at all enterprise development stages. However, this method has not been widely adopted for motor transport due to the difficulty of optimizing capacity based on the available normative framework.

Conclusions. Forming and utilizing the capacity of TM and CR zones must be optimized based on recognized criteria: maximum profit, minimum costs, and specified values of the technical readiness coefficient of the vehicle fleet. This would qualify the technological calculation method as optimization-oriented and adapted to the market conditions of enterprise

operation.

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ANALYSIS OF RESEARCH ON THE DURABILITY OF HYDRAULIC SYSTEMS OF MOBILE MACHINERY

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Problem statement. The problem of increasing the reliability of a hydraulic drive has been the subject of research by many authors. It has been found that the level of reliability of a hydraulic drive is determined by the concentration of mechanical impurities in the working fluid. Scientific and practical recommendations have been developed to ensure the industrial cleanliness of the hydraulic drive, the use of which provides a significant effect. Similarly, researchers, based on the provisions of the theory of friction and wear developed by scientists (I.V. Kragelsky, V.S. Kambatov, U.A. Ikramov, etc.), have made attempts to build analytical methods for determining the wear of hydraulic units. However, the assumptions made in this regard make these methods ineffective.

Main research materials. Nowadays, the direction of increasing the reliability of the hydraulic drive by improving the cleanliness control of components, units and systems of machines for various purposes has been developed, which is used in the operation of mobile machines and has high efficiency.

Research by the Cincinnati company (USA) shows that it is enough to increase the durability of hydraulic units by 5,5% to recoup the costs of equipping the hydraulic system with finer filters, which will extend the service life of parts by 46%, while the costs pay off in two weeks.

VNIIStroydormash conducted tests of pumps installed on EO-4121 excavators with different fixed composition of contaminants in the working