INNOVATIVE ALGORITHMS OF OPERATING PARAMETERS OF TRACTORS ON THEIR TECHNOLOGY OF CONSTRUCTIONS DURING MAINTENANCE

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Annotation

The economic side of the problem of increasing the level of operational and repair manufacturability of tractors is given increasing attention in all structures of tractor construction. It is advisable to increase the level of operational and repair manufacturability of tractors by determining the main directions, taking into account the adaptability of technical objects to operations of technical service and their diagnosis.

Keywords: Tractor, design, forecasting, operation, manufacturability, technical service, diagnostics.

Introduction. The cycle of creating a tractor consists of the stages of design, manufacture and operation. At the design stage, the main technical and economic indicators should be introduced into the design of the tractor: reliability, manufacturability of the design (TC), productivity, duration of maintenance (MOT) and repair, weight, and others.

Conducted research. The criterion of satisfactory technical and economic indicators of the tractor is determined during the design assessment of the TC, carried out during the design, taking into account the results of theoretical calculations. Until now, the design assessment of the structure is carried out without taking into account the parameters of the operation of the TC and maintenance of tractors [1-2].

To carry out such an assessment, it is necessary to develop an algorithm for the design assessment of the TC and maintenance of newly created agricultural tractors.

Quantitative indicators of the design assessment of the TC are established using analytical relationships between indicators and technical and economic characteristics of tractors [2-4].

Based on the statistical indicators, the following functional dependence can be established for use in the design assessment of the TC:

$$\mathbf{T_{уд} = f\ (N_e),}$$

where $\mathbf{T_{уд}}$ - specific labor intensity of the planned new tractor, h;

$\mathbf{f\ (N_e)}$ - function of effective engine power, ha / h.

The hourly productivity can be determined depending on the function of the effective engine power, and the labor intensity for the maintenance cycle - on the material consumption of the tractor.

$$\mathbf{T_ц = f\ (G) = f\ (M_к\ /\ N_e),}$$

where, G   - material consumption of the designed tractor, kg/kVt;

   Мк - constructive weight, kg.

The material consumption of the tractor is set by GOST in the form of a maximum value, the excess of which is not permissible. Therefore, it is necessary to monitor the mass, for which it is necessary to introduce its functional dependence on «**Ne**».

The algorithm for the design assessment of TC should end with a forecast of the TC coefficient during maintenance, the determination of which is provided for by OST 70.2.9-82 at the stage of operation [5-7].

$$К = \sum То\, /\, f\ (W_ч * Т_{уд}).$$

where **То** - operational labor intensity of the maintenance of the tractor, man-h;

   Wч - hourly productivity of the tractor, h / ha.

To establish these dependencies, we carried out a statistical analysis of extensive experimental studies, as well as the collection and processing of information on the reliability and duration of maintenance for all tractors for agricultural purposes.

Research results. The analysis of the patterns of the stated theoretical considerations and the processing of experimental data showed that with an increase in "Ne" of tractors, "Tud" decreases, and the values of "Wch" increase (see Fig. 1).
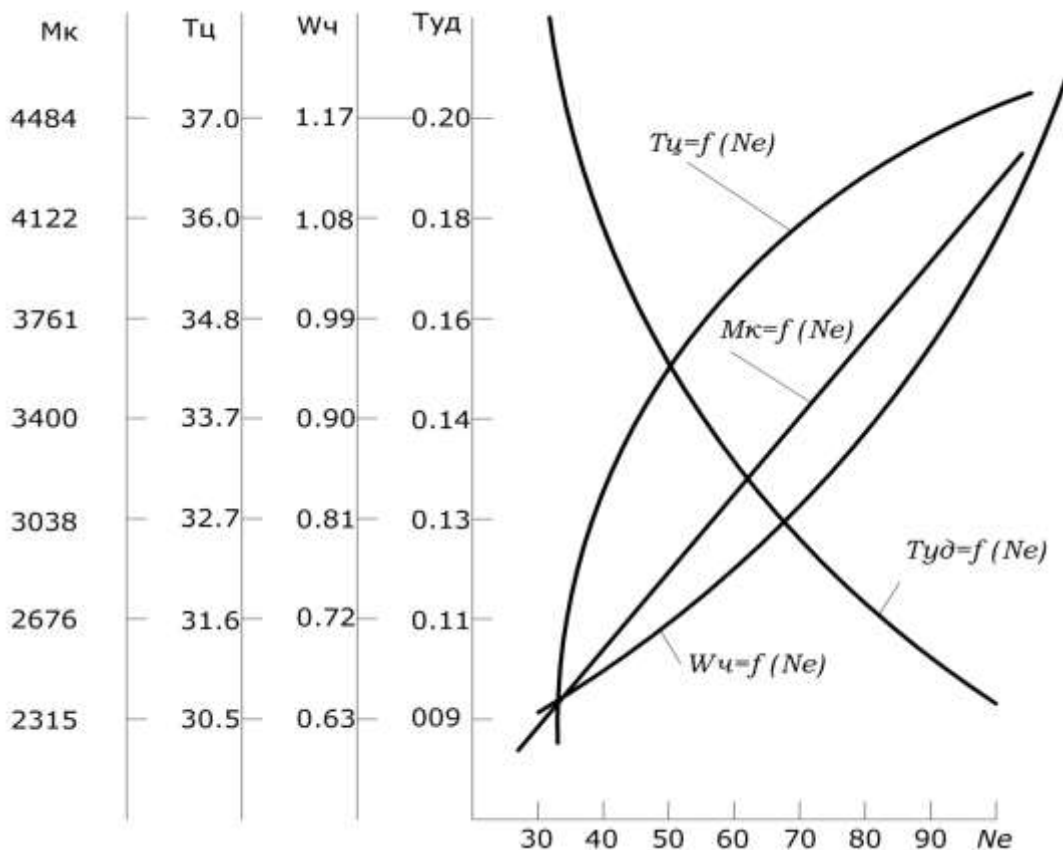
Rice. 1. Dependence of the specific and operational labor intensity for the maintenance cycle, productivity and constructive weight of tractors on the effective power of their engines.

For the design assessment of tractors without mathematical calculations, which take a lot of time, a nomogram has been developed for the preliminary determination of TC indicators during maintenance (see Fig. 2).
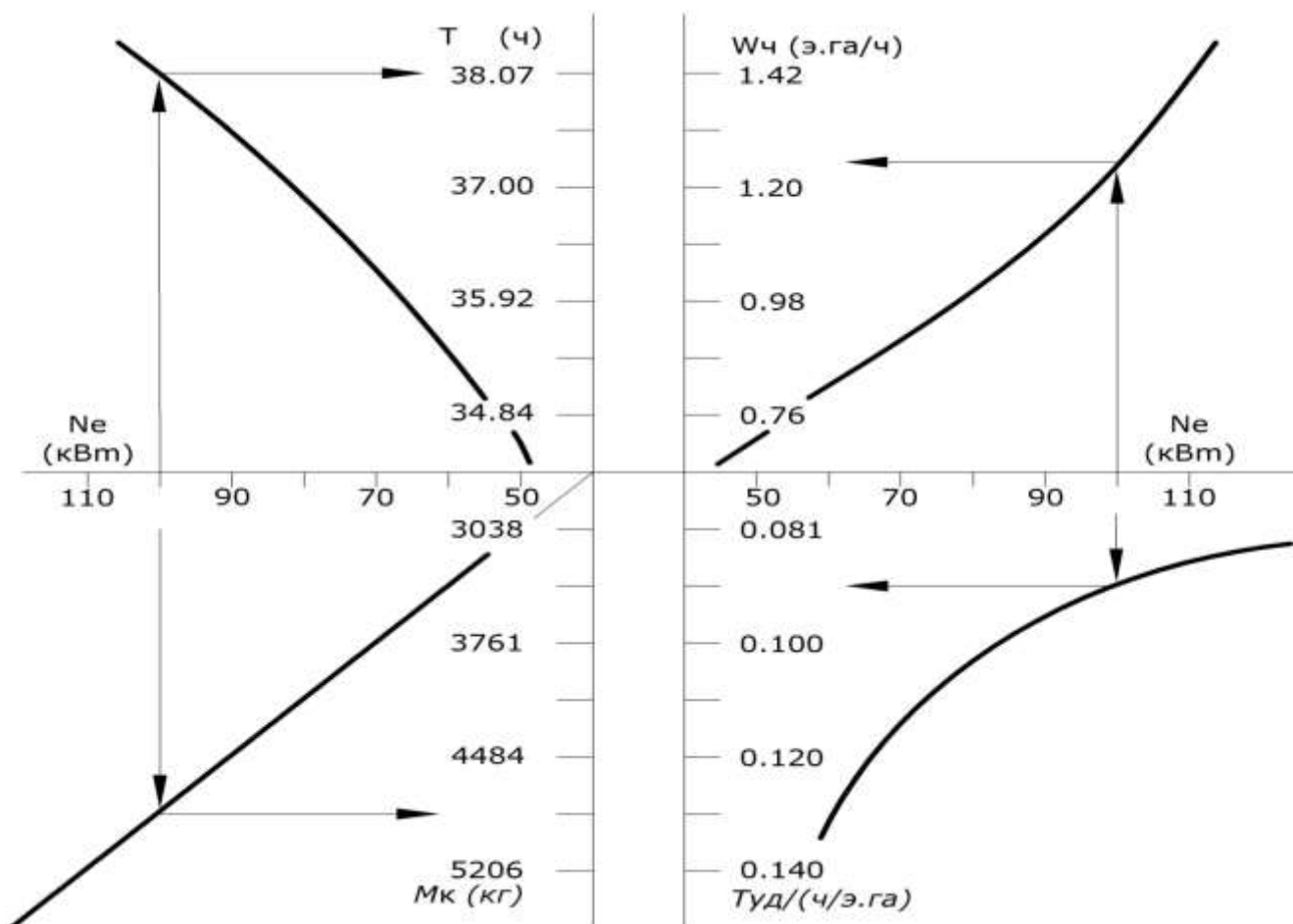

Fig. 2. Nomogram for preliminary determination of indicators of manufacturability of structures during maintenance of wheeled tractors for agricultural purposes.

The developed design assessment algorithm can be used as follows. For a new tractor design, by calculation using a model or the proposed nomogram, the boundary values of the TC indicators are determined. For example, if a tractor with a 100 kW engine is being designed, according to the nomogram, the productivity is 1.26 e.ha / h, and the average annual operating time is 1701 e.ha / year. The specific and operational labor intensity for the tractor maintenance cycle will be 0.092 h / e.ha and 38.07 h, respectively, and the constructive weight at this power will be 4845 kg.

Conclusion. The above numerical values of the indicators are the initial ones in determining the optimal design solution that meets the requirements of the design assessment of the manufacturability of the design for maintenance of agricultural tractors.

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